A LONGITUDINAL STUDY OF ALCOHOL RELATED HARM IN HEAVY DRINKING UNIVERSITY STUDENTS DURING THEIR STUDIES AND POST-GRADUATION, WITH PARTICULAR REFERENCE TO SPORT PARTICIPATION

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A Longitudinal Study of Alcohol Related Harm in Heavy Drinking University Students during Their Studies and Post-Graduation, With Particular Reference to Sport Participation

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Abstract

Alcohol is a widely abused substance in the United Kingdom, the estimated economic burden of alcohol is anywhere between £21 and £52 billion. Recent research has established elevated levels of alcohol consumption in university undergraduates, in particular students who take part in university sport, making them a population of particular concern amongst researchers. Recent studies have highlighted the need for longitudinal data to better understand if and how alcohol consumption changes post-graduation. Additionally, there is concern over the possible cognitive impacts of elevated alcohol use in undergraduates.

This thesis addresses the concerns outlined above in three separate studies. The first study comprised of a longitudinal online survey that took place over duration of 28 months. Participants completed the survey at 3 points, the first of which was towards the end of their final year of university. The survey used self-report measures to establish levels of alcohol and substance use, memory deficits and demographic data such as employment and sport participation. The second study ran alongside the first and took the form of 3 follow up interviews with the same sample of university sports participants. The aim of this study was to reveal motivations and perceptions of alcohol use. The final study was a lab based investigation into prospective memory (PM) of heavy drinking student who played sport and those who did not. The aim was to better understand differences in PM seen in the baseline phase of study one.

The key findings of this thesis were that alcohol use declined in students following graduation, and to a greater degree in students involved in sport. Despite this decline drinking was still rated as hazardous on average 28 months post-graduation. Additionally sport participation was still influential on elevated alcohol consumption both through the self-report data and in the perceptions of those playing sport.

These findings are of interest as this is one of the first studies of its kind completed in the UK in over 15 years. As such the findings should be used as a platform for further research into these fields to promote understanding and also to develop strategies to reduce alcohol consumption and its associated effects.

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Author's Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the Faculty Ethics Committee.

I declare that the Word Count of this Thesis is 41,302 words

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Date: 30/11/18

1 Introduction

1.1 Prevalence of Alcohol Use and Wider Consequences

Alcohol consumption is considered to be an important factor across recorded human history with impacts culturally, economically and on health (World Health Organisation, 2014). In the past, alcohol was consumed on an occasional basis at communal gatherings; however, its role in society has changed significantly with consumption occurring on a much more frequent basis (Gumede, 1995; Parry & Bennetts, 1998; Room Robin et al., 2002). Recent estimates put global alcohol consumption at around 6.2 litres of alcohol consumed per person aged over 15 years old each year (WHO, 2014). Alcohol consumption tends to be higher in more affluent countries and the incidence of heavy episodic drinking (HED), otherwise known as binge drinking, also rises with economic wealth (WHO, 2014). HED is defined as the consumption of 60g or more of alcohol on at least one occasion across the past month (WHO, 2014). This equates to approximately 6 or more drinks (8 units) in most countries, including the UK. This pattern of drinking is of concern to healthcare professionals and policy makers because it can cause negative consequences, such as social or health consequences, for individuals even if the average alcohol consumption of an individual is relatively low (WHO, 2014). Alcohol misuse is also a behaviour of interest due to the psycho-active and dependence producing qualities of alcohol. Alcohol misuse means drinking excessively – more than the lower-risk limits of alcohol consumption (NHS, 2015). Misuse can lead to higher risk behaviours such as alcohol dependence and addiction (Health & Services, 2014; Lim et al., 2012).

Alcohol is a widely abused substance in the United Kingdom, the estimated economic burden of alcohol is anywhere between £21 and £52 billion (England, 2016; Public Health England, 2013). Per capita consumption of alcohol has increased by more than double over the past 50 years (Sheron, 2004). This increase can, in part, be attributed to the large increase in consumption by women. Between 1984 and 1996 the proportion of men consuming over the recommended limit of 21 units per week remained fairly constant (Sproston & Mindell, 2006). During the same period the proportion of women consuming more than the weekly recommended limit of 14 units showed a marked increase (Sproston & Mindell, 2006). The most recent estimates of alcohol consumption suggest that 56.9% of the UK's population regularly consume alcohol (62.8 % of men vs 51.3% of women) (Office for National Statistics, 2017). Another factor in the high cost to society of alcohol consumption in the UK is the high levels of HED, with over 30% of alcohol consumption coming in this form (WHO, 2014). The proportions of people engaging in HED shows some interesting gender differences, with females in the 16-24 year old group more likely to engage in HED than their male peers (Office for National Statistics, 2017). Mortality rates related to alcohol consumption have increased steadily in the UK since 1979 (Department of Health, 1999).

1.2 Impacts on health and wellbeing

While research has occasionally attempted to link low to moderate alcohol use to an increase in the prevention of cardiovascular disease (Baum-Baicker, 1985a; Standridge, Zylstra, & Adams, 2004), dementia and osteoporosis (Standridge, et al., 2004), these views are now widely rejected. It has also been suggested that low to moderate consumption may reduce symptoms of depression and increase feelings of happiness (Baum-Baicker, 1985b). However, the majority of current research has

focused on the negative consequences of alcohol use. Alcohol is one of the world's largest disease risk factors, potentially contributing to over 3.3 million deaths worldwide annually (WHO, 2014). Bodies such as the World Health Assembly and the World Health Organisation (WHO) have published resolutions to try and promote strategies to reduce alcohol related harm (World Health Organization, 2009). The estimated impact of alcohol on the global mortality rate is approximately 5.9%, and its contribution to disability adjusted life-years is around 5% (Rehm et al., 2009). The economic costs associated with alcohol are also considerable, with costs estimated at 1% of gross national product in high and middle-income countries (Rehm et al., 2009). As such alcohol related harm has been deemed one of the most avoidable disease risk factors and there has been a global call to increase actions to reduce both the burdens and cost.

Alcohol abuse is linked to health problems such as hypertension, stroke, liver disease (Corrao, Bagnardi, Zambon, & La Vecchia, 2004), cancer (Schütze et al., 2011) and cognitive impairment (Spear, 2002). Alcohol consumption, and in particular HED, has been found to be causally related to over 60 different medical conditions (Room R., Babor, & Rehm, 2005).

The oldest and most well-known association between alcohol and ill health is that with liver disease (Maddrey, 2000). At the present time alcohol stands as one of the three leading causes of liver disease in the developed world (Fullwood, 2014). The most common occurrence of liver disease associated with alcohol consumption is the infiltration of fat in the liver, with more serious conditions such as alcoholic hepatitis and cirrhosis being less common (Maddrey, 2000). Conditions such as alcohol-induced fatty liver are reversible, with abstinence, however the damage caused by

conditions like alcoholic hepatitis and cirrhosis are not fully reversible even with permanent abstinence (Maddrey, 2000). A large scale investigation of the risk of developing alcohol related liver disease found that the level of alcohol intake where the relative risk was greater than 1 stood at 7-13 drinks per week for women and 14-27 drinks a week for men (Becker et al., 1996). Recent estimates of UK consumption patterns state that approximately 34% of males and 40.5% of females aged between 16 and 24 are consuming nearly this amount in a single drinking session, although they are less frequent drinkers than older drinkers (Office for National Statistics, 2017). These values are of particular interest as current recommended consumption limits put the maximum number of beverages that should be consumed a week between 4 and 9 (NHS, 2015). What is perhaps surprising is that only 10-15% of clinical alcoholics actually develop liver disease, indicating there is still much to learn regarding the factors governing susceptibility to liver disease (Maddrey, 2000). Despite these unanswered questions it is still considered that excessive alcohol consumption is a major risk factor for the development of liver disease in the UK (Fulwood, 2014).

Behaviours such as smoking have been repeatedly and publicly linked to an increased risk of developing cancer (Carter et al., 2015). However, while alcohol has been linked to various cancers in the current academic literature, public awareness of its contribution to cancer risk is lower than that of smoking (Buykx et al., 2016). This disparity is of concern when considering the number of people who practice both behaviours with a greater number consuming alcohol on a regular basis, 18% vs 79% of the population in the UK respectively (Office for National Statistics, 2017). Regular consumption of alcohol is estimated to directly contribute to close to 4% of all cancer deaths in the UK and US (Nelson et al., 2013; Parkin, Boyd, & Walker, 2011). The total number of different cancers with direct links to alcohol stands at 7 and current

understanding suggests there is no “safe” limit of alcohol consumption where risk of cancer isn’t increased (Cao, Willett, Rimm, Stampfer, & Giovannucci, 2015). However, it is known that as levels of alcohol consumption increase, so too do the risk factors for the development of cancer (Cao et al., 2015). The increasingly aging population (Office for National Statistics, 2017), coupled with the high rates of alcohol consumption found in developed countries (World Health Organization, 2011), means that it is likely that cancer rates in developed countries such as the UK will continue to increase. As such the need to address factors that contribute to diseases such as cancer are paramount as they contribute negatively to both economic and social wellbeing.

Alcohol abuse has been shown to increase harmful or risky behaviours including drink-driving (Wilsnack, Wilsnack, & Klassen, 1984), unplanned sexual activity (Newbury-Birch, White, & Kamali, 2000), increased violence, illicit drug use and increased risk of injury (Ross & DeJong, 2008). Risky behaviours fall on a spectrum; ranging from maladaptive normative behaviours such as maladaptive drinking and/or substance use, dangerous driving and casual sex, to more extreme behaviours such as bungee jumping and skydiving (Corte & Sommers, 2005). Studies from across the world estimate that around one third of adults engage in risky drinking behaviours, meaning drinking in a manner that places them at risk of negative consequences, over the course of a week (Corte & Sommers, 2005; Morojele et al., 2006). It has been suggested that the two areas where drinking has the greatest impact on risky & harmful behaviour are drink-driving and risky sex (e.g. having multiple or casual sex partners) (Cooper, 2002; Corte & Sommers, 2005; Morojele, et al., 2006).

When considering the relationship between hazardous drinking and risky driving, there is little experimental evidence to indicate that alcohol causes someone to engage in driving dangerously (Leigh B. C., 1999). However, the pharmacological effects of alcohol consumption, such as impaired reaction times and decision making, cause an elevated risk (Corte & Sommers, 2005).

Morojele and colleagues (2006) examined the relationship between alcohol consumption and risky sexual activity in South Africa, a country known to have a high incidence of sexually transmitted diseases such as HIV. Their research suggested that psychoactive changes related to alcohol use, such as increased sexual arousal and reduced anxiety and inhibitions gave rise to an increased chance of a risky sexual encounter. Similarly, research from the United States suggested that drinking was strongly related to the decision to engage in risky sex (such as engaging in unplanned casual sex) (Cooper, 2002).

Through these risky behaviours there is an impact on morbidity, which tends to be most common in young people. When compared with the rest of the lifespan the greatest rise in morbidity rates occurs within adolescence. Statistics from America estimate that 75% of all deaths amongst teens are from preventable causes (Center for Disease Control & Prevention, 2010). When considering risky behaviour such as drink-driving its contribution to fatal accidents can be as high as 33% in some countries with 75% of these fatalities made up of drivers under the age of 44 (Yi, Williams, & Dufour, 2002).

The aforementioned physical and behavioural impacts of alcohol use also have societal and social costs. The raw cost to healthcare and infrastructure has already been mentioned, but studies have also highlighted indirect costs such as costs

resulting from premature death and sickness, reduced working efficiency and excess unemployment (Devlin, Scuffham, & Bunt, 1997; Rehm, et al., 2009; Sullivan, Edgar, & McAndrew, 2019). This has been estimated at a cost of approximately £500 per employee for some businesses (Sullivan, et al., 2019).

1.3 Impact of Alcohol Use on Cognition

In addition to causing physical deficits, alcohol consumption also has detrimental effects on cognitive functioning. Short term impairments in balance, coordination, and memory have been demonstrated; and indeed some of these effects can go on to become more permanent deficits (NIAAA, 2004). The majority of this research has taken place in animal studies, with prolonged exposure to alcohol during adolescence leading to reduced performance on motor function and retrospective memory tasks (Hiller-Sturmhofel & Swartzwelder, 2004). Research has also shown impacts in heavy-drinking human samples, with impairment in memory observed both while intoxicated and also during periods of sobriety in adolescents and college students (Zeigler et al., 2005).

One of the aspects of memory that seems to be greatly affected by alcohol consumption is everyday cognition, incorporating such elements as prospective and everyday memory. Everyday memory refers to memory operations that routinely occur in one's daily environment. Examples of everyday memory include remembering names, remembering plans for the day, recalling items that one needs to purchase at the grocery store, remembering to take medications, and remembering telephone numbers, directions, or recent newsworthy events. Prospective memory is related to this but includes more specific detail related to future events. Prospective memory (PM) is the cognitive ability of remembering to carry out particular actions at some

future point in time and is seen as key to independent living (Brandimonte, Einstein, & McDaniel, 2014; McDaniel & Einstein, 2007). PM is thought to contain at least two elements; a prospective element in which one has to store an intended action and remember this action when a cue appears as a reminder or a specific period of time has passed before one has to act, and a retrospective element which enables you to recall the specific details of what it is (the action) you had to remember to do (McDaniel & Einstein, 2007). An example of this might be; plan to take an important medication immediately after finishing a meal (remembering a plan) and then upon finishing dinner recall what medication needed to be taken and in what dosage (retrospective element).

The literature provides evidence that there is a relationship between excessive drinking and everyday prospective memory (PM) deficits in both adult (Heffernan T, Moss, & Ling, 2002) and in 16-19 year olds (Heffernan T. M. et al., 2006). Deficits in prospective memory could result in situations such as forgetting to meet with friends on time, forgetting to post a letter on time or remembering to pick up medication from the pharmacy. The importance of prospective memory in everyday living is not to be underestimated, and any deficits in prospective memory may have significant consequences to the individual.

Increased failures in everyday memory (EM) have also been observed in relation to excessive drinking (Ling et al., 2003). These deficits could have potentially dangerous costs in everyday life, such as forgetting to take important medication on time. Current thinking suggests that EM and PM are underpinned by central executive (CE) processes (Collette & Van der Linden, 2002), and that PM and CE share prefrontal and frontal lobe resources in the brain (Simons, Schölvinck, Gilbert, Frith, &

Burgess, 2006). CE refers to the notion of a limited-capacity attentional controller in memory that controls the flow of information around the memory system and is responsible for planning, co-ordinating and executing commands within memory (Rabbitt, Bent, & Mclnnes, 1997). PM deficits (measured using the Prospective Memory Questionnaire) and accompanying CE deficits (measured by the Dysexecutive Questionnaire) have been found in the same cohort of young adult excessive alcohol users when compared with low dose controls (Heffernan Thomas, Ling, & Bartholomew, 2004). Taken together, the research to date supports the notion that excessive drinking may well damage everyday prospective remembering and associated central executive processes. This is of particular interest as research in the past decade has identified these areas as being susceptible to alcohol induced deficits (Bava & Tapert, 2010).

1.4 Alcohol Use through the life span

Alcohol abuse has been shown to be prevalent across the adult lifespan with studies examining DSM-IV disorders placing it as the second most prevalent disorder, displayed in over 13% of adults (Kessler et al., 2005). While alcohol abuse is of concern across an individual's lifespan there are some age groups that are of particular interest to researchers. The World Health Organisation (2014) highlighted children (under 15), adolescents (15-19) and elderly populations (over 65) as the most at risk of alcohol related harm as a result of their consumption.

More recent research has focused on preventing alcohol related deaths in older populations by trying to understand how age of onset of drinking affects prevalence of drinking in later life (Grant & Dawson, 1997; Kessler, et al., 2005). Grant and Dawson (1997) suggested that the odds of dependence later in life decreased 14% with each

increasing year of age at onset of use, with the odds of abuse decreasing by 8%, up to an age of 20 years. Given the increased risk of later life dependence due to early onset of drinking, adolescent drinkers are a section of the population of particular interest to researchers.

Rates of adolescent alcohol consumption are higher in the UK than in other countries in Europe and Worldwide (Hibell et al., 2012). There are similar trends for HED in UK adolescents (Hibell et al., 2012). Drinking trends in adolescents are also of interest as heavy drinking in these years of life are often linked with consequences such as poor academic performance (Gill, 2002; Perkins, 2002; Singleton, 2007), increased substance use (Hibell et al., 2012) and physical consequences such as injury or death (Gunzerath, Faden, Zakhari, & Warren, 2004).

There is also concern about the impact of alcohol on the brain in adolescent populations. Previous research examining the effects on the brain following exposure to ethanol, reported that there was a link between alcohol exposure and maturational processes within the developing brain (Spear, 2002). This is of significance because the human brain is still developing until the late twenties (Spear, 2002). The adolescent brain undergoes dynamic change in terms of its neurochemistry, architecture and overall tissue composition (Bava & Tapert, 2010). Excessive drinking by individuals of this age could be causing damage to their still-developing brains and this may have serious adverse effects later in life. Similarly, research into cognitive performance following binge drinking has identified deficits in verbal memory, working memory and decision making (Courtney & Polich, 2009; Hartley, Elsabagh, & File, 2004).

1.5 Students as an at risk group

One group of people of particular interest in alcohol research are university students, as a significant proportion of University students fall into the category of adolescents (Universities UK, 2015). University students have consistently been identified as a group that is prone to abuse alcohol and engage in hazardous alcohol use, with recent research showing that the majority of students at a sample of universities in England consume hazardous levels of alcohol on a regular basis (Davoren, Demant, Shiely, & Perry, 2016; Heather et al., 2011). Previous research in the UK (Gill, 2002), the USA (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994) and many other countries, including Australia, Brazil, Ecuador, Germany, New Zealand and Nigeria (Karam, Kypri, & Salamoun, 2007) has found that university students drink alcohol on average above the "sensible limits" recommended by government and health authorities. According to Davoren & colleagues (2016) systematic review, alcohol consumption is the most prevalent public health concern amongst university students. This review also concluded that despite increased efforts, levels of consumption have continued to increase over the past couple of decades (Davoren, et al., 2016).

A 2011 study by Heather et al. focussed on the relationship between alcohol consumption and sport participation among students, and found that a sample of 770 undergraduates at universities in England showed a mean score of 9.5 on the Alcohol Use Disorders Identification Test (AUDIT) (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). This is higher than the cut-off point on the AUDIT (8+) for the designation of an alcohol use disorder. Overall 61% of the sample was classified as having an alcohol use disorder by the AUDIT, with over a third (35%) "binge drinking" on a weekly basis. One limitation of the study by Heather et al. (2011) is that it did not

include a measure of other drug use. Given the observation that excessive alcohol use is often accompanied by other substance use, such as cigarette smoking or cannabis (Wicki, Kuntsche, & Gmel, 2010), it would have been useful had the survey provided estimates of such co-morbidity in hazardous drinkers.

The AUDIT is able to indicate degrees of alcohol-related risk or harm by placing individuals into zones based on their score on the test (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). These zones are: Low Risk, Hazardous, Harmful and Probable Dependence. Longstaff et al. (2014) found that 41% of their overall sample of 439 university students fell into the “Hazardous” category, defined as individuals whose pattern of alcohol consumption increases the risk of harmful consequences. However, it is not possible to estimate the proportion of hazardously-drinking students who will reduce their consumption, continue to drink at a hazardous level or develop harmful drinking patterns or alcohol dependence after they leave university. It has been suggested that heavy drinking among students is a relatively harmless expression of youthful high spirits which they will grow out of after graduation and once they assume the full responsibilities of adult life (Vik, Cellucci, & Ivers, 2003). This phenomenon is referred to as “maturing out” of heavy drinking (O'Malley, 2004; Vik, et al., 2003). However, this may not be the case and it is possible that hazardous drinking among students could in many cases lead to alcohol-related problems later in life.

Of the remaining participants in the Longstaff et al. study, 11% were identified as “harmful drinkers”, with 9% falling into the “Probable Dependence” category (Longstaff et al., 2014). Again, it is not possible using current evidence to predict what proportions of these individuals will maintain or alter their drinking behaviour, and how any changes may affect long-term health and welfare. One other set of findings from

this research concerns students' readiness to change their drinking behaviour in terms of the stages of change model (Prochaska, DiClemente, & Norcross, 1992). For example, of all those showing an alcohol use disorder as measured by the AUDIT, 51% were still in the "precontemplation" stage and apparently unconcerned about their drinking (Longstaff et al., 2014). If nothing occurs to change these attitudes it is not unreasonable to assume that problem drinking will continue and possibly progress following graduation from university.

1.5.1 Student Drinking and Sport

One key subset of students who have been identified as particularly heavy drinkers are those involved in university sport. While some earlier studies found alcohol consumption in students who participate in sport to be low (Anderson, Albrecht, McKeag, Hough, & McGrew, 1991; Donato et al., 1994) there is a growing body of research that suggests that these students are drinking excessively (Leichliter, Meilman, Presley, & Cashin, 1998; Miller et al., 2003; Nattiv & Puffer, 1991; O'Brien, Blackie, & Hunter, 2005; Partington et al., 2013).

The suggestion that sport participation may be associated with lower alcohol consumption is predominately based on the idea that a high motivation to achieve and maintain physical fitness, coupled with a strong athletic identity, places psychological limits on alcohol consumption (Bower & Martin, 1999). As such it has been theorised that encouraging sport participation may be effective as a tool to reduce alcohol consumption (Murphy, Correia, Colby, & Vuchinich, 2005; Polymerou, 2007).

However, the majority of more recent research has shown the relationship between university sports participation and alcohol consumption to be very different. In a survey of student athletes, by the National Collegiate Athletic Association (NCAA),

responses indicated that students involved in university sport drank excessively and in greater quantities than their non-sporting peers (Green, Uryasz, Petr, & Bray, 2001). Studies examining the drinking behaviours of students playing recreational organised sport have also found similar drinking habits (Ward & Gryczynski, 2007).

The pattern in which alcohol is consumed amongst students, and in particular student athletes has also been widely considered. Thombs (2000) suggested that the differences in alcohol consumption between student athletes and their non-athlete peers is in the quantity that they consume and not how often they drink. Studies have found that students who are involved in university sport binge drink at significantly higher levels than non-sport peers (Doumas, Turrisi & Wright, 2006; O'Brien et al., 2008; Partington et al., 2013). To emphasise this point, it has been observed that the proportion of student athletes reporting that they drink 10 or more drinks in one sitting significantly increased over a 16 year period between 1989 and 2005 (Thompson & Sherman, 2007).

Another factor to consider in the relationship between alcohol consumption and sport participation is the type of sport played by the athlete. Athletes involved in team sports, such as football, hockey and basketball, have been shown to drink more than participants of other sports, in particular runners (Ford, 2007). In the study by Partington et al. (2013), it was found that while students who participated in sport had a significantly higher mean score on the AUDIT than those who did not, heavy drinking was especially high among students who took part in team sports as opposed to individual sports (Partington et al., 2013). O'Brien and Lyons (2000) commented that the social aspects of sport participation are strongly linked with alcohol consumption. This may go some way to explaining this difference between sport types as the social

aspects of team sports are more easily apparent. Indeed, it has been reported that athletes have more friends and also place more importance on social activities than non-athletes (Nelson & Wechsler, 2001).

Personality traits associated with athletes have also been investigated as a potential factor in the relationship between alcohol consumption and sport participation. Successful athletes may be more likely to possess risk taking personality types which in turn would increase their tendencies to engage in heavy drinking (Martens, Dams-O'Connor, & & Beck, 2006; O'Brien & Lyons, 2000). The existence of a “work-hard, play-hard” mentality in sports participants is a related factor that may encourage drinking to excess (Leichliter, et al., 1998). Grossbard and colleagues highlighted the important role that competitive situations, such as drinking games, played on mediating student-athlete drinking (Grossbard, Geisner, Neighbors, Kilmer, & Larimer, 2007). They found that such games were more likely to occur in student-athletes of varying levels of competition. Finally, the unique pressures associated with being a student athlete may direct these individuals to use alcohol as a coping strategy (Leichliter et al., 1998). Parsons (2013) highlighted the unique time-constraints and competing external pressures from academic and sporting entities on student athletes. One such example of these pressures is sporting scholarships, often these scholarships have an academic performance caveat attached which can affect eligibility for participation (Parsons, 2013). When coupled with pressure to perform athletically to maintain selection a pressure unique to student athletes is created.

1.6 Long-term drinking behaviour

Alcohol patterns are known to fluctuate across the lifespan and this kind of change is not fully represented in cross-sectional data (Britton, Ben-Shlomo,

Benzeval, Kuh, & Bell, 2015). Despite the need for longitudinal data, such data is scarce and as such, there is a need for more research of a longitudinal nature.

A recent systematic review has attempted to illustrate the changes in alcohol consumption across the full lifespan in Britain (Britton et al. 2015). The findings from this study demonstrated that drinking in men rose sharply during adolescence, peaking at age 25 with a mean consumption of 20 units per week, before a decline and plateau in mid-life followed by a decline from around 60 years of age. A similar trend was seen in women although the amount consumed was much lower, with a peak of 8 units observed. This finding is of interest as recent research into drinking amongst students in the UK has demonstrated a much higher level of consumption in female participants (Partington et al., 2013) which is indicative of a narrowing gap in consumption levels between the genders.

One criticism of the model developed in the systematic review study is that a notable proportion of the longitudinal studies used to construct the model of alcohol consumption are quite dated, with all of the cohorts comprising of participants born prior to 1980. While this allows for a more complete look at the consumption of alcohol across the lifespan, it makes the data less relatable to current groups of young adults, as there are significant cultural differences from people of a similar age 40+ years ago. One such example is the proportion of young people who go onto further education and university aged 18, which has increased greatly during this period, rising from less than 100,000 people in 1980 to over 350,000 in 2012 (Bolton, 2012). Despite the limitations of the review, there is valuable support for the phenomenon of “maturing out” with decreased amounts of alcohol consumed as age increases. Alongside this, the frequency of consumption increased across the lifespan. As such, alcohol consumption in younger people is characterised by drinking large quantities on a few

occasions across a week. As people grow older, they began to drink less overall but drink on a more frequent basis.

There have been several investigations of drinking changes across the lifespan in international samples. Epidemiological data from the United States suggest that heavy drinking peaks in the early twenties and then declines steadily (Bachman et al., 2014). This is not dissimilar to the trend observed by Britton and colleagues in their UK based investigation, and adds support to the “maturing out” theory. It has been suggested that this “maturing out” takes place as young people no longer see drinking alcohol as a way to feel more adult because of the adoption of new adult like roles (marriage, employment, parenthood) and these behaviours are incompatible with the responsibilities that accompany these roles (Bachman et al., 2014). However, it has been suggested that these milestone life events are taking place later in life these days than they have previously and as such this may prolong the period in which people are engaging in heavy drinking (Arria, Bugbee, Caldeira, & Vincent, 2014). In support of this idea, data from the United States has shown that the decline in alcohol consumption with increasing age has been slowing down in more recent samples (Moore et al., 2005).

1.6.1 Students

The university experience typically takes place at the beginning of adulthood where several longitudinal investigations have established drinking is at its heaviest in both men and women (Britton et al., 2015, Bachman et al., 2014). Additionally, going to university is seen as a key life transition (Schulenberg & Maggs, 2002). During this period, young people’s behaviour fluctuates and changes as they adjust to the differences of adult life. Drinking behaviour is not exempt from this process. There is

clear evidence from cross-sectional studies that students are drinking at hazardous levels, and in excess of their non-student peers. Additionally, there are a growing number of studies that have looked at the changes in student drinking across the university experience (Arria et al., 2016; Bewick B., Trusler, Mulhern, Barkham, & Hill, 2008; Ferrer Rebecca A., Dillard, & Klein, 2012b). In a 2008 investigation examining drinking in UK university undergraduates, Bewick and colleagues found that alcohol consumption was high across the duration of their studies. It was observed that weekly levels of consumption decreased across the course of university however, they remained high for a substantial number of students even in their final year (Bewick et al., 2008). The authors explained this decrease in drinking levels as a result of increasing responsibility, greater concern and motivation for and importance placed on coursework and grades alongside growing thoughts about future careers (Bewick et al., 2008)

In another study examining drinking in students, Arria and colleagues (2016) sampled over 1000 US university students to assess their drinking habits across their early adult years. In contrast to Bewick, they found that frequency of drinking increased steadily across the course of university life. This study also found that the number of days where binge drinking took place also increased across the course of a student's time at university (Arria et al., 2016). While these results are striking, the authors acknowledge the limitation in drawing comparisons with drinking at universities that do not follow the US collegiate pathway. Additionally, the difference in legal age of consumption means that within a US sample students aren't legally allowed to drink in the majority of states until midway through their studies which may explain the increase in frequency. Within the UK some studies have also shown a trend of increased alcohol consumption amongst undergraduates as they progress through

their degrees (Newbury-Birch, Walshaw, & Kamali, 2001) although more current data is now needed.

In addition to examining changes in drinking behaviour during university, several studies have looked at how drinking behaviour changes following graduation from university. Arria and colleagues (2016) found in their study on drinking after graduation that graduates tended to drink more frequently but in lower quantities than when they were students. One interesting note from this study was that students who were binge drinkers prior to beginning university continued to drink at higher levels than their peers after university. It was suggested that establishing drinking patterns prior to university might be an effective strategy in reducing adult drinking (Arria et al., 2016). A Spanish study observed that the notion that drinking increases while at university, and subsequently decreases following graduation is a phenomenon only observed in students who didn't engage in heavy drinking prior to university (Moure-Rodriguez et al., 2018). Additionally they concluded that students who were already engaging in heavy drinking prior to university were much more likely to be engaged in similar drinking behaviours several years post-graduation (Moure-Rodriguez, et al., 2018).

Newbury-Birch and colleagues (2001) conducted the last significant study in the UK to look at changes in drinking behaviour after university. This particular study sampled medical students at two time points during their university studies and once more, after they had graduated. Interestingly, this study found that alcohol consumption increased significantly across the three time points of the study, with mean alcohol consumption in junior doctors being higher than the second year of medical school by more than 3 units. This finding goes against the phenomenon of "maturing out" which would suggest that alcohol consumption should decrease with

age and increasing life responsibilities (Vik, et al., 2003; O'Malley, 2004). Indeed, Vik and colleagues (2003) suggested that over a fifth of US students reduced their drinking without the need for intervention as a result of this phenomenon. There are several explanations for this surprising trend, with the most apparent being the type of students used. Career progression within the medical profession is typically highly stressful, and is regularly assessed for several years post-graduation, evidenced by over two thirds of recent graduates reporting high levels of stress (Royal College of Anaesthetists, 2017).

Table 1 below highlights some of the key longitudinal studies on alcohol use in students. Only a few of these studies have looked at consumption levels post-graduation and the method of recording alcohol use differs slightly on each study. There are also a range of sample sizes from 122 up to over 5000, however only 225 participants completed all time points on this study.

Author(s)	Year	Country	Tool	Sample	Sampled Post-Graduation	Finding
Arria et al.	2016	USA	Frequency of Drinking	1128	Yes	Decreases in alcohol quantity but not frequency. High frequency drinking patterns that develop during college appear to persist several years postgraduation.
Bewick et al.	2008	UK	Health Guidelines	5895 (225)	No	Student alcohol consumption declines over their undergraduate studies; however weekly levels of consumption at Year 3 remain high for a substantial number of students
Ferrer et al.	2012	USA	2 Item Scale	239	No	Personal alcohol consumption decreased across the students time at university
Moure-Rodriguez et al	2018	Spain	AUDIT	1382	Yes	The prevalence rates of both RC and BD at age 27 years were much higher among university students who already followed these patterns of consumption at age 18 years
Newbury-Birch et al.	2001	UK	Health Guidelines	122	Yes	Mean alcohol consumption had increased significantly (P<0.015) over the three time points; 15.2–16.0–18.8 units/week

Table 1 Summary of Key Longitudinal Alcohol Papers Since 2001

1.6.2 Sport

As sport is linked to increased drinking in several studies, it is important to consider how alcohol consumption changes alongside changes in sport participation over time. Sport participation peaks during adolescence and begins to decline into early adulthood, which is at the same time as young people make the transition to university (Kwan, Bobko, Faulkner, Donnelly, & Cairney, 2014). Studies have neglected to establish if a change in sporting participation during the period following university also lead to a change in alcohol.

1.7 Thesis Research Questions

Taking what is known regarding student drinking and the potential consequences of prolonged heavy alcohol use, there are three main research questions that make up this thesis. The first, and primary question is to consider a longitudinal perspective on students' relationship with alcohol. Specifically, does the phenomenon of "maturing out" occur, and what factors might have an influence on this? The next research question considered in this thesis is the nature of the relationship between sport participation and alcohol consumption. This will be investigated from both a quantitative and qualitative perspective to not only see how this might change over time but also to understand why. The final question in this thesis is the exploration the impact of alcohol consumption on everyday memory and executive function in students and recent graduates. This will be looked at from a longitudinal perspective to see if there is any impact on their memory while at university and if this changes following university, alongside any potential changes in alcohol use. It will also be examined in a cross-sectional study to verify any potential findings on the online memory tools.

2 Methodologies

Across the 3 studies that comprise this thesis a range of methodologies were used. Mixed methods approaches to research have been growing in use over the past decade with procedures developed to analyse a wide range of research questions. The pragmatic advantages of using mixed methods when exploring research questions mean it is possible to provide a deeper understanding of survey responses and statistical analyses, which can provide a more detailed assessment of individual responses (McCusker & Gunaydin, 2015). It is being increasingly recognised that research that draws on the strengths of both qualitative and quantitative approaches is essential for the most robust results (McCusker & Gunaydin, 2015). This chapter will outline the methodologies used in the 3 studies conducted as part of this thesis.

2.1 Study 1: Longitudinal Survey

2.1.1 Participants

Final year students across all courses from a university in the north of England were contacted by email to take part in this study. They were fully informed of the experimental protocol and procedures before providing written informed consent to participate. A total of 261 male and female students completed at least the full AUDIT and comprised the initial sample, with 75 in the sample at phase 2 and 40 at phase 3. Previous longitudinal studies haven't reported as high levels of attrition, however these were typically conducted face to face (n = 1132, Arria et al., 2016; n = 122, Newbury Birch et al., 2001). However, a study that sampled students across university only had 38 % of students respond across the whole survey, which is closer in terms of attrition to this investigation (Bewick B. M. et al., 2008). Mean age was 21.4 (SD = 2.63, range

19 – 57), the majority of the sample was from a white ethnic background (94.3%) and 68.6% were female. Participants' involvement in sport was also recorded with 19.2% (N=50) being involved in organised sport. These same participants were re-approached on an annual basis for two additional years creating three distinct data collection points.

2.1.2 Study Design

The overall study design was longitudinal in nature, with a baseline phase of data collection in the participants' final years followed by two additional collection points following graduation. Participants were required to complete an online questionnaire designed and distributed using Survey Monkey. This consisted of several existing scales measuring alcohol and drug use, various aspects of memory, and some general demographic questions. Prior to the first phase of data collection, a pilot study was conducted to test the reliability and validity of the online questionnaire. Following pilot testing the reliability and validity of all of the tools was good ($r > 0.35$) with the exception of one subscale of the PMQ (the Short- term Memory subscale). Subsequently this was removed from the final questionnaire for longitudinal testing as there are other subscales already included in the test battery that map the same aspect of PM.

2.1.3 Protocol

A link to the online questionnaire was provided to all participants. The questionnaire included several existing measures in addition to demographic questions. The measures included and the areas they assess were:

1. General demographics including: sex, age, degree course/employment status, current sports teams played for, highest level of competition,

intensity of participation, recent injury, stage within the season (pre-, during or post-season), ethnicity, whether or not they were currently abstinent from alcohol and/or drugs and, if so, reasons for being abstinent.

2. The Alcohol Use Disorders Identification Test (AUDIT: Saunders et al., 1993) to measure alcohol consumption, risk and harm and to provide data comparable to other surveys of alcohol use disorders among students. The AUDIT has been successfully used in the past to determine drinking patterns in students (Heather, et al., 2011) and later in life (Reinert & Allen, 2007) and provides a robust measure of alcohol use and related problems. The internal consistency and reliability are high with Cronbach's alpha being reported at 0.86.
3. The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) to measure associated drug use. The ASSIST is a comprehensive test battery developed by the World Health Organisation as a measure able to determine risky, hazardous or harmful substance use (Newcombe, Humeniuk, & Ali, 2005). The ASSIST is designed to be administered by a trained health professional as the response to one question determines which of the following questions should be asked. Where the ASSIST is administered via a web site, the items are made interactive so that the response to one item activates or deactivates subsequent items (Cunningham & Van Mierlo, 2009). Reliability for each subscale varies slightly although is good for all included, with Cronbach's alpha scores ranging between 0.73 (Tobacco) and 0.92 (Alcohol)
4. The *Prospective Memory Questionnaire* (PMQ) to measure everyday PM. The PMQ is a valid and reliable self-report measure of everyday PM, and

provides measures of two aspects of PM (Hannon, Adams, Harrington, Fries-Dias, & Gipson, 1995). Its questions measure long-term PM (alpha = 0.85) and internally-cued PM (alpha = 0.86). Additionally, there is a Strategy subscale which provides a measure of the number of strategies used to aid remembering (alpha = 0.89). The participant rated how often they experienced failures on a 9-point scale ranging from 'never' to increasing frequency of forgetting. A mean score was calculated, with a higher score indicating more memory slips/failures experienced.

5. The *Everyday Memory Questionnaire* (EMQ) to measure general everyday memory. It has been shown to have high reliability in previous use (alpha = 0.94). The EMQ is able to measure common memory lapses in everyday memory (Sunderland, Harris, & Baddeley, 1983). Participants respond on a nine-point scale ranging from 'Not at all in the last 6 months' to 'More than once a day'. A total score is calculated and the higher the score, the more forgetting is evident.
6. The final measure, the Webexec questionnaire, assesses the 6 main components of executive function – including attentional difficulties, problems in concentration, one's ability to multitask, perseverance on a task, and impulse control (Buchanan et al., 2010). The EFQ shows high internal consistency, with the reliability on Cronbach's alpha being 0.78. For each item, participants responded by circling one response from a four-point scale: 1) No problems experienced; 2) A few problems experienced; 3) More than a few problems experienced; 4) A great many problems experienced. An overall score is computed with a higher score indicating more executive deficits experienced.

Typically, the completion of the questionnaire took no longer than 15 minutes. The data collection window for phase 1 ran from the beginning of March till the end of May 2013, phase 2 was July to October 2014 (16-20 months post-graduation) and the final phase was May to July 2015 (26-28 months post-graduation). To try to reduce attrition between each phase of the data collection incentives were offered in the form of a prize draw for £150 of amazon vouchers at each phase. Incentives such as this have proven effective in combating attrition in previous longitudinal studies (Audet, 2004). There was a slight delay to the start of phase 2 dues to issues with funding for the incentives at this phase. Additionally a Facebook and Twitter profile were set up to provide regular topical information on the subject of student drinking. The university research ethics committee granted ethical approval prior to the commencement of data collection.

2.1.4 Data Analysis

At each phase, descriptive statistics were generated and a series of comparisons were conducted on the data using independent samples t-tests employing post-hoc Bonferroni corrections. Additionally, correlations were calculated to test for any relationships among the various measures included in the questionnaire. Significance was accepted at the 5% level for all statistical analysis.

To examine the impact of sport participation on alcohol use over the course of the study a mixed effects model was employed. A mixed effects model was chosen due to the attrition in the data between phases. Mixed effects models use maximum likelihood estimation and as such, data can be used from all participants even if they did not have data for each phase. When data are missing, the likelihood function is factored in. The likelihood is computed separately for those cases with complete data

on some variables and those with complete data on all variables. These two likelihoods are then maximized together to find the estimates. This approach allows each phase's data for estimations of means at that trial. Maximum likelihood approaches to missing data give unbiased parameter estimates and standard error (Plonk, Butler, Grace-Martin, & Pelletier, 2011).

2.2 Study 2: Longitudinal Interviews

2.2.1 Study Design

Adopting a qualitative approach enables the researcher to gather rich and detailed information about human events and experiences (Dey, 2003). It is particularly effective when considering information that, if reduced to numerical form, will lose most of its meaning and value (Dey, 2003). Another advantage of adopting a qualitative approach to research is that it allows for investigation of complex processes and relationships from different peoples' perspectives (Dey, 2003). As such, it is particularly valuable when researching a topic that has a limited existing evidence-base (Dey, 2003).

2.2.2 Participants

Following approval from the Faculty ethics panel, potential participants were contacted via email regarding their participation in the study (Appendix i). Prospective participants were selected from the study one sample and were approached based upon their answers to that survey. To fit with the focus on how alcohol consumption relates to sport participation, students were contacted who self-identified as playing sport while at university, either for a university team or an external team. All participants were individuals who were categorised as hazardous (score of 8-15) on the AUDIT based on their completion of the survey at phase one (final year at

University). This category of scores was selected because based on the findings from study one it was reflective of typical alcohol consumption for students in the sample who played sport. After approaching all suitable candidates (n=50), nine final year students were recruited. Out of these nine students, eight were retained through all three phases to study completion; participant 9 was the only one to withdraw, leaving the study prior to the final stage of data collection. Table 5 presents a summary of their age at recruitment (Mean age at recruitment = 21.2 (SD, 0.97), their gender, their level of sporting involvement, their employment status and AUDIT score at each phase.

Table 2 Sample characteristics for Study 2

ID	Age	Sex	Sport TP 1	Sport TP 2	Sport TP 3	Employed TP 2	Employed TP3	AUDIT TP 1	AUDIT TP 2	AUDIT TP 3
Jade	20	F	Jiu Jitsu	Jiu Jitsu	Jiu Jitsu	Student	Employed	8	4	4
Alan	21	M	Football	Football	Football	Employed	Employed	20	24	20
Lucy	21	F	Football	-	-	Employed	Unemployed	18	7	6
Billy	23	M	Rugby	Rugby	Rugby	Employed	Employed	20	17	15
Sean	22	M	Football	-	Football	Student	Employed	10	4	6
Ellie	21	F	Gymastics	-	-	Employed	Employed	8	4	4
Dina	22	F	Athletics	-	-	Employed	Employed	16	8	8
Katy	20	F	Rugby	Rugby	Rugby	Employed	Employed	19	13	15
Rochelle	21	F	Rugby	-	-	Employed	Unemployed	17	13	N/A

2.2.3 Protocol

Data was collected using semi-structured interviews. In a semi-structured interview, the researcher is equipped with a list of general questions that cover key topics that they believe are relevant to the research question (Kallio, Pietilä, Johnson, & Kangasniemi, 2016). The key difference when compared to a structured interview is that should a participant provide an answer that warrants a more in depth discussion then the researcher has the flexibility to pursue this (Kallio et al., 2016). This is important to the qualitative process as it ensures that the experiences of each participant are expressed in full (Kallio et al., 2016).

In total three separate interviews were conducted with eight of the nine participants. These were conducted at three separate phases, with at least a gap of 12 months in between each of the interviews. The data collection was designed in this way to allow a picture to develop of how each participant's motivations and perceptions of alcohol consumption changed as they moved further in time from their graduation. As participants were also involved in the online survey AUDIT scores were also available for each participant as a record of their alcohol consumption. The first round of interviews took place at the end of the students' final year of university with the second and third round of interviews taking place 18 and 30 months post-graduation respectively. The interviews took place at these phases as they followed on from data collection for study one. The initial interviews took place on the university campus. Follow up interviews were conducted via a mixture of face-to-face (7 total) and telephone interviews (9 total) depending upon the participant's location. All interviews were audio recorded to ensure that no relevant data would be lost in the analysis process. Participants were given a designated numerical ID to enable their data to be treated with confidentiality.

All participants were provided with a participant information sheet (Appendix ii), which detailed the purpose of the study, what the study entailed, and how the information derived from the interviews would be used and stored. Written, first person informed consent was gained from each participant prior to commencement of the first phase of the study (Appendix iii). An interview guide was devised using commonly occurring themes from previous literature to form the basis of the questions asked (Appendix iv). Prior to study commencement a pilot interview was held with a 21-year-old female gymnast who had scored in the hazardous category for alcohol consumption. Following the initial pilot interview, this guide was deemed appropriate

to gain the desired data from the scheduled interviews. The same interview guide was used with each participant to ensure consistency of the topics discussed. However, the use of semi-structured interviews allowed each participant to deviate from this to discuss areas more relevant to their personal experiences. The second and third phases of data collection used slightly amended interview guides, to reflect the fact that the participants were no longer full time undergraduate students. Copies of these guides can be found in appendix v.

Following completion of the interviews, participants were provided with a copy of a debrief sheet. The debrief sheet provided additional details on the purpose of the study, along with the researcher's contact details and instructions on how to ask for their data to be removed from the study if they wished to do so (Appendix vi).

2.2.4 Data Analysis

Prior to data analysis, all interviews were transcribed verbatim to ensure a complete record was created of what had been said, and to enhance the researcher's familiarity with the data (Dey, 2003). To provide some context to the results, the initial phase of the data analysis consisted of describing the drinking behaviours exhibited by the participants at each phase, and then identifying how these behaviours changed across the three phases. The main focus of the analysis then became about understanding what decisions and motives underpinned these drinking behaviours. Each interview was coded and analysed using thematic analysis in line with the principles set out by Braun and Clarke (2006). Interviews were initially grouped by phase creating three separate analyses. Themes were then compared across phases to see how motivations developed and changed both individually and as a group.

The process of thematic analysis was used to identify, analyse and classify patterns (themes) within the data. A theme was defined as something, which captures an important aspect of the data in relation to the research question (Braun & Clarke, 2006). Themes were created by first generating initial codes from the data at a line-by-line level. This was done inductively, using the data itself to drive coding and therefore not being influenced by a particular theoretical framework. Following this initial coding, commonly occurring themes were identified from the codes. These themes were then reviewed and grouped based upon their relatedness. This allowed for construction of a hierarchal model of main themes and sub-themes. At this point the analysis was more theoretically driven. Reference was made to existing literature on drinking motives to help label and group the themes.

2.3 Study 3: Lab based study of memory

2.3.1 Participants

Individuals were contacted prior to study recruitment to complete a short questionnaire incorporating general demographic questions to determine their age, sex, involvement in sport and their current drinking levels using the AUDIT. From responses to this questionnaire people were recruited on the basis of their current drinking levels being similar in terms of AUDIT classification to a typical student, as characterised in the longitudinal study. This sample was further divided into two groups using their sporting participation as the category. This enabled a sample of 24 students to be tested, 12 who were participating in sport, 12 who were not participating in sport. This sample would be sufficient to detect a medium effect size (0.41) following a power calculation. Mean age of the overall sample was 20.58 (SD = 1.44, range 19-26), the majority of the sample was from a white ethnic background (91.67 %) and 45.83 %

were female. When splitting the sample for sport participation, those who played sport had a mean age of 20.17 (SD = 1.03, range 19-22), all of the sample was from a white ethnic background and 41.67 % were female. Those did not play sport had a mean age of 21 (SD = 1.71, range 20-26), the majority of the sample was from a white ethnic background (83.33%) and 50% were female. The overall AUDIT score for the sample was 12.04 (SD = 4.54, range 8-23). When comparing between groups the mean AUDIT score for sports participants was 13.25 (SD = 5.15, range 8-23), and for those not playing sport it was 10.83 (SD = 3.66, range 8-18).

2.3.2 Study Design

This study utilised a between groups design with participation in sports acting as the independent variable. Performance on the Prospective Remembering Video Procedure (PRVP) acted as the dependent variable. Participants were selected based on their current alcohol consumption and as such, there were no intended co-variates.

2.3.3 Protocol

Objective PM was measured by the PRVP based on a methodology used by earlier researchers to study cannabis and binge-drinking (Bartholomew, Holroyd, & Heffernan, 2010; Heffernan Thomas, Clark, Bartholomew, Ling, & Stephens, 2010). The PRVP involved presenting a list of 15 specific locations (e.g. ‘When you reach the Halifax store’) accompanied by a list of associated actions (e.g. ‘Check if your loan has cleared’) that the respondent viewed for 90 seconds. The location and action mirror the prospective and retrospective elements of prospective memory respectively. The participant then watched a 10-minute video clip of a busy shopping area depicting a range of shop fronts and passers-by that contained the previously presented to-be-recalled location–action combinations (see Table 6 for the full list of combinations)

along with a series of distracter events. Examples of such distracters include the emergence of other (non-target, yet similar in type) shop locations, and passers-by that appear on the video clip (in addition to the main targets identified in Table 6), but that do not require a response. This therefore increases the complexity of the task and makes the task more akin to real-life PM functioning. Before watching the video clip, the participant was instructed that he/she should only write down each location–action combination on a blank response sheet when the familiar location was reached on viewing the video clip and not before. This was to ensure that the participant recalled each combination as part of the ongoing PM task presented on the video clip. The participant was observed by the experimenter throughout the PRVP in order to ensure that he/she only wrote down the particular action when the specific location was reached and to ensure they carried out the distractor task. All of the participants followed this instruction clearly. One point was given for each location–action combination correctly recalled, ranging from 0 to 15, with the higher score indicating more proficient PM. The PRVP has been used in previous research and shows good reliability and validity with the scores attained by participants during the task significantly correlated with the total number of prospective memory failures reported on the PMQ ($r = 0.24$, $p = 0.03$, $n = 90$) (Bartholomew et al., 2010; Heffernan, et al., 2010). Data collection took place over a period of 6 weeks beginning the 25th of April 2016. The Northumbria University Newcastle ethics committee granted ethical clearance prior to commencement of data collection.

2.3.4 Data Analysis

Descriptive statistics were generated and a series of comparisons were conducted on the data using independent samples t-tests. Each sub-scale of the

PVRP was analysed as well as the overall score resulting in 3 main comparisons. Significance was accepted at the 5% level for all statistical analysis.

Table 3 Location and Action combinations for the PVRP

LOCATION	**ACTION/MEMORY**
When a man asks for change	*Check pocket for 20p*
At the store 'Halifax'	*Ask if your loan cheque cleared?*
At the 'Dixons' store	*Check the price of 'PlayStation3'*
At the 'Card Store'	*Ask directions to train station*
At 'W H Smiths'	*Ask if any job available*
At the 'HMV' store	*Buy an album*
At 'Burger King'	*Buy a milkshake*
When you reach the flower store	*Note the colour of its roof*
When a woman speaks to camera	*What does she say?*
Woman on bench with dog	*Note the colour of the bags she was carrying*
At the 'Thorntons' shop	*Note what the figure is in the window*
At the 'Orange' shop	*Buy £10 top-up card*
At the Body Shop store	*Ask someone the time*
At the store 'Clinton Cards'	*What event is highlighted in shop window?*
Outside the 'Link' store	*What instrument is the man playing?*

3 A longitudinal online survey of student drinking

3.1 Introduction

As stated in the introduction the primary aim of this thesis is to understand the changes in drinking patterns in young people following their graduation from University. Of particular interest is how sport affects the drinking behaviour of these individuals, and whether or not this association between sport and alcohol changes over time, as an individual moves away from the university environment. It has previously been demonstrated that students who participate in sport have a level of alcohol consumption. This has been found to be higher than that of their non-sporting peers (Heather et al, 2011, Partington et al., 2013) but no longitudinal studies have been carried out exploring the relationship between sport and alcohol use.

Several studies over the past two decades have made strides to confirm the pattern of drinking amongst students at university (Britton et al., 2015, Bachman et al., 2014). These patterns are characterised by high levels of consumption localised around a few specific drinking sessions, otherwise known as heavy episodic drinking. Risk factors for the development of alcohol use disorders, in students, include factors such as the year of study a student is engaged in and the location of their accommodation. Students earlier in their degree cycle have been shown to be at the greatest risk, especially when combined with on-campus living. While overall levels of consumption decline somewhat as a student's degree progresses, levels of alcohol consumption have been found to be classified as hazardous at all stages of a student's life at university (Barratt & Cooke, 2018; Bewick B. M., Mulhern, et al., 2008).

One of the main oversights in the current literature is the lack of recent longitudinal investigations into the drinking habits of young people following their graduation from university. Newbury-Birch and colleagues conducted the most recent large scale study of this nature in the UK. The study was carried out in 2001 and specifically targeted medical students. A sample of approximately 100 students were followed over three years of undergraduate study. The students showed consistently high levels of alcohol consumption during their time at university. This high level of consumption continued during their careers as newly qualified doctors. This finding is in direct contrast to the phenomenon of maturing out, in which alcohol consumption would be expected to decline following graduation with the advent of adult responsibilities and behaviours (Vik et al., 2003).

Doctors have a unique career path compared to other university graduates and the profession is known to be amongst the most stressful in young adults (Royal College of Anaesthetists, 2017). Due to these factors, it is therefore difficult to generalise the finding of Newbury-Birch's study to other student populations. There are over 105,000 different degree choices in the UK currently and these courses have varying lengths and modes of delivery (Universities UK , 2015). It is therefore necessary to look at the wider student populations' drinking habits following university to draw a clearer conclusion regarding how alcohol use is characterised following graduation.

Aside from the study by Newbury-Birch, Walshaw and Kamali there has been some recent longitudinal research from outside the UK on alcohol use in students during and post university. Arria et al. (2016) examined a student population in the United States, incorporating data from their years at university and up to 4 years post-graduation. Interestingly Arria and colleagues (2016) found that alcohol use

demonstrated evidence of “maturing-out”, but only with regard to the quantity of alcohol consumed. They found that in US graduates, frequency of drinking stayed at a rate comparable to that of an individual’s time as a student for several years’ post-graduation. This evidence is contrary to that of previous studies, which suggest that quantity changes little in the immediate period following graduation from university (Newbury-Birch et al., 2001).

It is with this varied evidence in mind that the aims of the current study were determined. The first aim of the study is to characterise alcohol consumption and substance use amongst final year students at a UK university and to explore how this changes within the first two and a half years following university. The final aim of this longitudinal investigation is to explore any potential relationship between sport participation and alcohol consumption during university and to see if this changes over time, following graduation. Data was drawn from study one, highlighted in the methodologies chapter.

3.2 Methods

Please see chapter 2.1 for further details.

3.3 Results

3.3.1 Phase 1

3.3.1.1 Sample Characteristics

Table 1 gives overall demographic and other background details of the overall sample. There were a total of 261 participants recruited from across the university. Mean age was 21.4 (SD = 2.63, range 19 – 57), the overwhelming majority of the sample was from a white ethnic background (94.3%) and 68.6% were female. The

participants' involvement in sport was also recorded with 19.2% (N=50) being involved in organised sport.

Table 4 Demographic and other background details of sample (All Phases)

	Phase 1						Phase 2				Phase 3			
Gender	Male = 31.4% (n = 82)			Female = 68.6% (n = 179)			Male = 29.3% (n=22)		Female = 70.7% (n=53)		Male = 25.0% (n=10)		Female = 75.0% (n=30)	
Age	Mean = 21.4 (SD = 2.63) Min = 19 Max = 57						Mean = 22.38 (SD = 1.19) Min = 21 Max = 27				Mean = 23.67 (SD = 1.31) Min = 22 Max = 27			
Ethnicity	White = 94.3% (n=246)	Black = 0.8% (n=2)	Asian = 1.9% (n=5)	Chinese = 0.8% (n=2)	Mixed = 1.1% (n=3)	Other = 1.1% (n=3)	White = 97.3% (n=73)	Asian = 1.3% (n=1)	Mixed = 1.3% (n=1)		White = 95.0% (n=38)	Asian = 2.5% (n=1)	Mixed = 2.5% (n=1)	
Currently Participates in Sport	Yes = 19.2% (n=50)			No = 80.8% (n=211)			Yes = 21.3% (n=16)		No = 78.7% (n=59)		Yes = 12.5% (n=5)		No = 87.5% (n=35)	
Highest Level of Competition	Social/Intra-Mural = 29.9% (n=78)	BUCS/Regional = 12.6% (n=33)	National = 8.4% (n=22)	International = 3.4% (n=9)			Social/Intra-Mural = 43.2% (n=18)	BUCS/Regional = 40.5% (n=15)	National = 10.8% (n=4)	International = 5.4% (n=2)	Social/Intra-Mural = 47.1% (n=8)	BUCS/Regional = 35.3% (n=6)	National = 17.6% (n=3)	
Injured	No = 64.8% (n=169)		Currently = 5% (n=13)		Recently = 4.6% (n=12)		No = 86% (n=49)	Currently = 5.2% (n=3)	Recently = 8.8% (n=5)		No = 93.1% (n=27)		Recently = 6.9% (n=2)	
Currently Drinking Alochol	Yes = 90.4% (n=236)			No = 9.6% (n=25)			Yes = 90.7% (n=68)		No = 9.3% (n=7)		Yes = 95.0% (n=38)		No = 5.0% (n=2)	

3.3.1.2 AUDIT Scores

Overall sample:

AUDIT scores were obtained for all 261 participants. Mean AUDIT score (N=261) was 11.10 (SD = 5.86, range 0-40). This is higher than the cut off points of 7+ for women and 8+ for men for a hazardous drinking classification. A total of 78.2% of participants scored above the cut off point for hazardous drinking on the AUDIT.

The AUDIT can be summarised into four risk categories, these are as follows: low risk drinkers = 0-6 for women and 0-7 for men; hazardous drinkers = 7-15 for women and 8-15 for men; harmful drinkers = 16=19; probable dependence = 20+ (Babor, Higgins-Biddle, Saunders & Monteiro, 2001). In the sample, participants were distributed as follows: low risk = 57 (21.8%); hazardous = 142 (54.4%); harmful = 46 (17.6%); probable dependence = 16 (6.2%). A breakdown can be seen in figure 2 below.

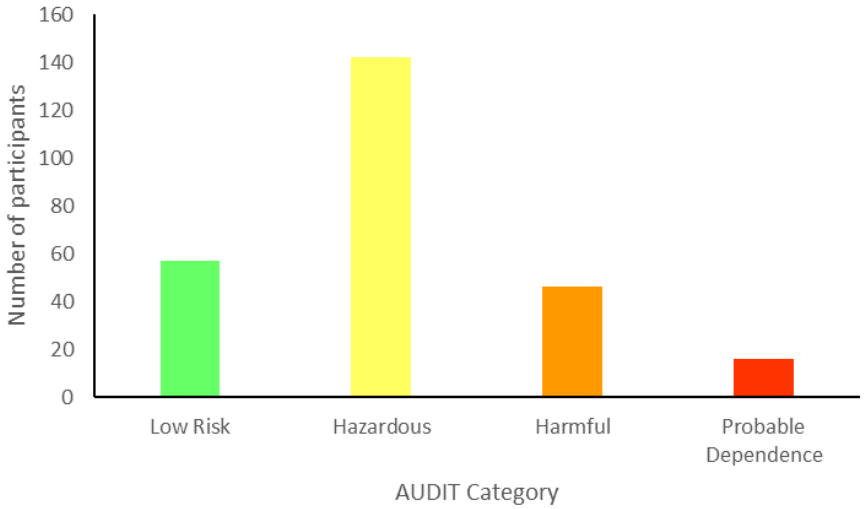


Figure 2 AUDIT Category breakdown (Phase 1)

Never Drinkers and Abstainers:

Within the sample, there were 2 individuals who were classified as “never drinkers” and had never tried alcohol. In addition to these “never drinkers” there were a further 23 participants who were currently abstaining from alcohol consumption. These 25 participants made up 9.6% of the overall sample. When these participants were excluded from analysis mean AUDIT score increased to 11.6 (SD = 5.68, range 1-40).

Sport Participation:

The sample was divided based on participants’ involvement in sport, with participants being placed into one of three groups; playing members of sport teams/groups, non-playing members of sports teams/groups and those with no sport involvement. Students who participated in sport had a mean AUDIT score of 13.0 (SD = 6.73, range 0-32), students who were non-playing sports members had a mean AUDIT score of 10.1 (SD = 5.71, range 0-20) and students who did not participate in sport in any form had a mean AUDIT score of 10.6 (SD = 5.54, range 0-40). Employing Bonferroni post-hoc testing, the difference between students actively participating in sport and those with no involvement was significant (p = 0.03). There were no significant differences between playing members and non-playing members (p = 0.17), and between non-playing members and those with no involvement (p = 1.00).

Table 5 Analysis of Variance: Sport participation and AUDIT Score

	df	MS	F	*p*	Effect Size
Between Groups	2	124.40	3.70	0.03	0.03
Within Groups	258	33.63			
Total	260				

Students who participated in sport were further broken down based on whether they were involved in team sports (e.g. football, basketball, rugby) or individual sports (e.g. running, swimming, cycling). The mean AUDIT score for team sports participants was 13.1 (SD = 6.43, range 0-32) and the mean AUDIT score for individual sports participants was found to be 10.04 (SD = 4.43, range). An independent t-test showed this difference between team and individual sports to be significant (t = 3.31, df = 48, $p < 0.01$).

Gender:

No significant difference was found following an independent t-test between mean AUDIT scores of female (10.9, SD = 5.44, range 0-40) and male (11.2, SD = 6.06, range 0-32) students (t = -0.35, df = 259, $p = 0.73$).

Degree Type:

Within the sample students were split based on their degree type, either sport (N=38) or non-sport (N=223). Students on sport degrees had a mean AUDIT score of 13.3 (SD = 7.44, range 0-32), whereas students on non-sport degrees had a mean AUDIT score of 10.6 (SD = 5.47, range 0-40). An independent t-test found the

difference between students on sport degrees and those on non-sport degrees to be significant (t = 2.60, df = 259, *p* = 0.01).

3.3.1.3 ASSIST Scores

ASSIST scores were obtained for 248 participants. The ASSIST covers the use of a total of 10 substances. Mean ASSIST scores can be found below in table 6.

Table 6 Mean ASSIST Scores (All Phases)

Substance	Phase 1	Phase 2	Phase 3
Tobacco	(N= 245) 3.93 (SD = 7.12, range 0-30)	(N= 70) 2.80 (SD = 5.33, range 0-22)	(N= 37) 2.78 (SD = 4.66, range 0-17)
Alcohol	(N=248) 11.00 (SD = 7.70, range 0-39)	(N=71) 8.20 (SD = 4.73, range 0-20)	(N=37) 7.49 (SD = 4.72, range 0-21)
Cannabis	(N= 243) 1.83 (SD = 4.48, range 0-32)	(N= 68) 1.04 (SD = 1.91, range 0-10)	(N= 37) 1.13 (SD = 2.38, range 0-10)
Cocaine	(N=238) 0.91 (SD = 3.11, range 0-23)	(N=68) 0.62 (SD = 2.12, range 0-14)	(N=36) 1.06 (SD = 2.69, range 0-11)
Amphetamines	(N= 241) 1.05 (SD = 3.2, range 0-27)	(N= 69) 0.52 (SD = 1.40, range 0-8)	(N= 36) 0.61 (SD = 2.11, range 0-9)
Inhalants	(N=240) 0.03 (SD = 0.22, range 0-2)	(N=68) 0.09 (SD = 0.73, range 0-6)	(N=36) 0.11 (SD = 0.67, range 0-4)
Sedatives	(N= 239) 0.34 (SD = 1.75, range 0-20)	(N= 69) 0.33 (SD = 1.43, range 0-9)	(N= 36) 0.14 (SD = 0.59, range 0-3)
Hallucinogens	(N= 240) 0.17 (SD = 1.17, range 0-15)	(N= 69) 0.12 (SD = 0.58, range 0-4)	(N= 36) 0.17 (SD = 1.00, range 0-6)
Opioids	(N=236) 0.42 (SD = 0.40, range 0-5)	(N=68) 0.03 (SD = 0.24, range 0-2)	N/A
Other Drugs	(N= 224) 0.27 (SD = 0.30, range 0-4)	N/A	N/A

Results on the ASSIST can be summarised into three intervention categories, these are as follows: No intervention, Brief intervention, Intensive intervention. The boundaries of these categories changes depending on the substance in question. For alcohol, a score of 0-10 represents no intervention being necessary, a score of 11-26 represents the recommendation of a brief intervention and a score of 27+ accompanies a recommendation of an intensive intervention. For all other substances,

the categories are 0-3 for no intervention, 4-26 for a brief intervention and 27+ for an intensive intervention. The only two substances that had a mean ASSIST score in one of the intervention categories were tobacco and alcohol. For tobacco 183 (74.7%) participants were recommended no intervention, 55 (22.4%) were recommended a brief intervention and 7 (2.9%) were recommended an intensive intervention. For alcohol 133 (53.7%) participants were recommended no intervention, 102 (41.1%) were recommended a brief intervention and 13 (5.2%) were recommended an intensive intervention.

Sport Participation:

There were no significant differences on any of the substance scales between the groups involved in sport (playing member, non-playing member). When breaking the sports participants down into individual and team sports participants there was a significant difference for ASSIST scores on the alcohol subscale ($t = 3.29$, $df = 128$, $p < 0.01$), with team sports participants scoring a mean of 12.71 (SD = 7.55, range 0-33) compared to 9.05 (SD = 4.98, range 0-19) for individual sports participants.

Gender:

Female students reported significantly lower levels of cannabis use (1.43, SD = 3.45, range 0-26) than male (2.72, SD = 6.12, range 0-32) students ($t = -2.11$, $df = 241$, $p = 0.04$), however both mean scores were in the no intervention category.

Degree Type:

When splitting the sample based on degree type, one significant difference was found on the ASSIST questionnaire. On the other drugs scale, students on sport degrees had a mean score of 0.13 (SD = 0.70, range 0-4), whereas students on non-

sport degrees had a mean score of 0.01 (SD = 0.14, range 0-2). An independent t-test found the difference between students on sport degrees and those on non-sport degrees to be significant (t = -2.03, df = 222, *p* = 0.04).

3.3.2 Phase 2

3.3.2.1 Sample Characteristics

Table 1 gives overall demographic and other background details of the overall sample. There were a total of 75 participants retained from the original study. Mean age was 22.38 (SD = 1.19, range 21 – 27), again the majority of the sample was from a white ethnic background (97.3%) and 70.7% were female. In terms of involvement in sport, 21.1% (N=16) were playing in organised sport.

3.3.2.2 AUDIT Scores

Overall sample:

AUDIT scores were obtained for all 75 participants. Mean AUDIT score (N=75) was 9.84 (SD = 5.00, range 0-24). A total of 66.7% of participants scored above the cut off point for hazardous drinking on the AUDIT.

Participants were distributed as follows: low risk = 25 (33.3%); hazardous = 43 (57.3%); harmful = 3 (4.0%); probable dependence = 4 (5.3%).

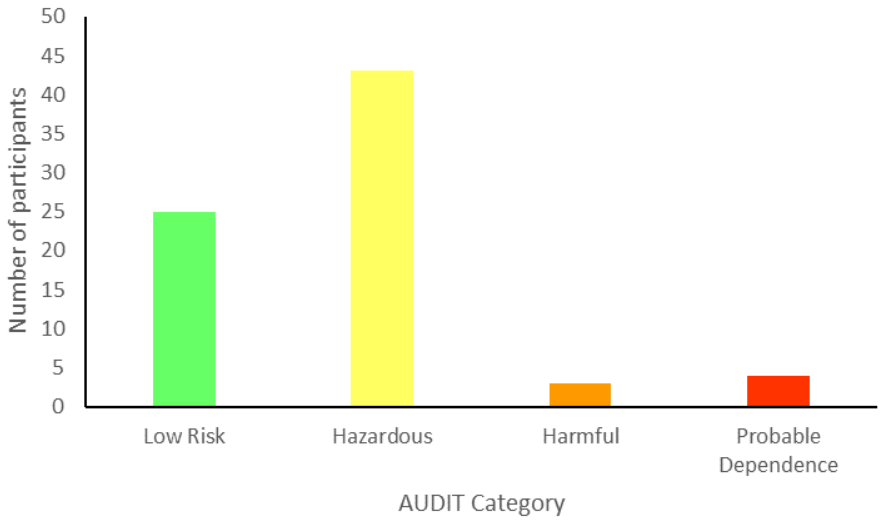


Figure 3 AUDIT Category breakdown (Phase 2)

Sport Participation:

The sample was again divided based on participants' involvement in sport with participants being placed into one of three groups; playing members of sport teams/groups, non-playing members of sports teams/groups and those with no sport involvement. People who participated in sport had a mean AUDIT score of 12.0 (SD = 6.14, range 3-24), individuals who were non-playing sports members had a mean AUDIT score of 8.6 (SD = 4.67, range 4-16) and those who did not participate in sport in any form had a mean AUDIT score of 9.31 (SD = 4.56, range 0-23). While there was a difference in the AUDIT scores of participants playing sport and those with no involvement, following a t-test employing Bonferroni post-hoc testing, the difference was not significant (p = 0.06). There were no significant differences between playing members and non-playing members (p = 0.27), and between non-playing members and those with no involvement (p = 0.74).

People who participated in sport were further broken down based on whether they were involved in team sports (e.g. football, basketball, rugby) or individual sports (e.g. running, swimming, cycling). The mean AUDIT score for team sports participants was 12.0 (SD = 5.59, range 6-24) and the mean AUDIT score for individual sports participants was found to be 12.0 (SD = 8.60, range 3-23). This difference between team and individual sports was not significant.

Gender:

No significant difference was found following an independent t-test between mean AUDIT scores of female (10.05, SD = 4.67, range 1-23) and male (9.31, SD = 5.80, range 0-24) participants (t = 0.58, df = 73, p = 0.56).

3.3.2.3 ASSIST Scores

ASSIST scores were obtained for 75 participants. Mean ASSIST scores can be found in table 6.

No interventions were recommended for any of the reported substances. This remained the case when comparing the participants based on their sports participation.

Gender:

A significant difference was found following an independent t-test between ASSIST scores of female (3.56, SD = 6.03) and male (0.74, SD = 1.19) participants (t = 2.02, df = 68, $p < 0.01$) for the tobacco subscale, however both mean scores were in the no intervention category.

3.3.3 Phase 3

3.3.3.1 Sample Characteristics

Table 1 gives overall demographic and other background details of the overall sample. There were a total of 40 participants retained for the final phase of data collection. Mean age was 23.67 (SD = 1.31, range 22 – 27), the majority of the sample was from a white ethnic background (95.0%) and 75% were female. The participants' involvement in sport was also recorded with 12.5% (N=5) being involved in organised sport.

3.3.3.2 AUDIT Scores

Overall sample:

AUDIT scores were obtained for all 40 participants. Mean AUDIT score (N=40) was 8.48 (SD = 4.50, range 0-20). A total of 62.5% of participants scored above the cut off point for hazardous drinking on the AUDIT.

Participants were distributed as follows: low risk = 15 (37.5%); hazardous = 21 (52.5%); harmful = 3 (7.5%); probable dependence = 1 (2.5%).

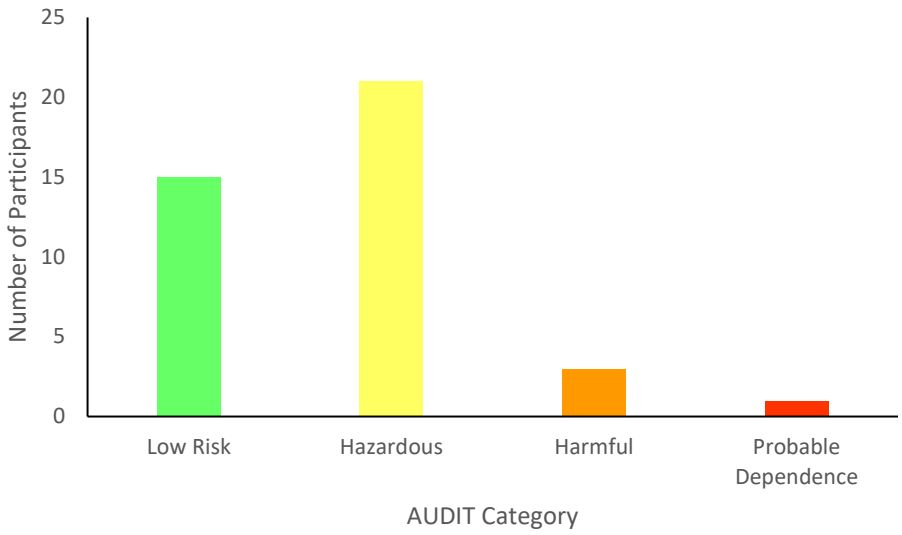


Figure 4 AUDIT Category breakdown (Phase 3)

Sport Participation:

At this stage, participants' involvement in sport fell into only two groups; playing members of sport teams/groups and those with no sport involvement. Those who participated in sport had a mean AUDIT score of 9.20 (SD = 5.26, range 3-16), participants who had no involvement in sport in any form had a mean AUDIT score of 8.37 (SD = 4.46, range 0-19). Employing Bonferroni post-hoc testing, the difference between people actively participating in sport and those with no involvement was not significant (p = 0.70). All participants at this stage still involved in sport were active in team sports.

Gender:

A significant difference was found following an independent t-test between mean AUDIT scores of female (9.33, SD = 4.33, range 3-19) and male (5.9, SD = 4.18, range 0-12) participants (t = 2.19, df = 38, p = 0.04).

3.3.3.3 ASSIST Scores

ASSIST scores were obtained for 37 participants. Mean ASSIST scores can be found in table 6. None of the measures showed need for intervention within the sample population.

Sport Participation & Gender:

There were no significant differences between any of the sports participants and those with no involvement, or between male and female participants.

3.3.4 Longitudinal Comparison

When comparing mean AUDIT score across the three phases there was a reduction in scores as students moved further from graduation. This change is not significant when comparing scores at phases 1 and 2, or phases 2 and 3. However this difference is significant when comparing phase 1 (11.10) to phase 3 (8.48) ($t = 2.68$, $df = 301$, $p < 0.01$).

Following the mixed effect model analysis of AUDIT score with sport participation across the 3 phases, AUDIT score was shown to be 2.61 higher in participants who played sport ($t = -3.59$, $df = 207.61$, $p<0.01$).

3.4 Discussion

The first aim of the study was to characterise alcohol and substance use amongst final year students at a UK university and to explore how this changes in the period immediately following university. The data collected by this study supports the findings of previous research within the UK context that students typically drink at hazardous levels (Heather et al., 2011; Partington et al., 2013). Consumption levels and the risk of negative consequences do decline post-graduation, as would be

suggested by the maturing out hypothesis (Vik et al., 2003). However, the average graduate in this sample was still drinking at levels classified as hazardous on the AUDIT, two years following graduation.

The final aim of this longitudinal investigation was to explore any potential association between sport participation and drinking levels whilst at university and following graduation. At university, there was a very strong association between alcohol consumption and sport participation, with student athletes drinking at much higher levels than other students. As the participants moved further from university their reported alcohol, consumption declined. Additionally across the three phases, the gap between the participants playing sport, and those who were not, lessened. However, despite this analysis revealed there was still a contribution of sport participation on increased alcohol consumption.

Previous research into alcohol consumption amongst university students has demonstrated “high” levels of alcohol consumption (Partington et al., 2013). This phenomenon was further strengthened by the findings here with the majority of participants showing alcohol consumption at hazardous levels or above on the AUDIT. Additionally, previous studies have established that students who play sport typically drink at higher levels than their non-sporting peers (Partington et al., 2013), and that there doesn’t appear to be any gender gaps in alcohol consumption. This was again supported by the findings of this study, with a clear elevation of AUDIT scores in students who played sport and no discernible difference in alcohol consumption between male and female students. Further analysis of the data from sports participants revealed that people involved in team sports drank at higher levels than those competing in individual sports, something that has also been demonstrated in past research (Heather et al., 2011: Partington et al., 2013). An additional

phenomenon observed by Heather and colleagues (2011) was that students who were studying on sport degrees were also at risk of higher levels of drinking. This was another trend supported by the findings of the current study.

One criticism of past studies of alcohol use in university students was the failure to examine other substance use as there is often a co-morbidity of abuse (Wicki et al., 2010). To examine the use of other substances the ASSIST questionnaire was used. The only indication of potential co-morbidity was the slightly increased use of tobacco in students who were heavy drinkers. This is a common association in existing literature (Wicki et al., 2010) but tobacco use was at much lower levels than alcohol use. Sport participants were much less likely to consume tobacco than non-sporting peers. This could likely be due to the widely publicised negative impact of tobacco use on cardiovascular performance (McBride, 1992). Additionally, scores recorded from the ASSIST further supported the elevated levels of consumption of alcohol in students who were playing sport and those who were studying sport degrees.

At phase 2, alcohol consumption for the sample as a whole had reduced, but not significantly so. This has implications in terms of the phenomenon of maturing out, and it is possible that graduates are not yet far enough removed from university behaviour to make a change in their drinking behaviour. Approximately two thirds of the sample were still drinking at hazardous levels or above over a year since graduating from university. This could be a result of the very high levels of consumption at university leading to a slower decline, or that the individuals perception of drinking is that it is at a sensible level. Interestingly, while participants still involved in sport reported higher levels of consumption and risk with their drinking, the gap between them and their non-sporting peers was no longer significant. It is possible that changes in drinking culture surrounding sport participation, (i.e. weekend fixtures instead of

midweek) outside of university aid maturing out in these individuals, leading to a faster reduction in alcohol consumption. As was the case at phase 1 there were no gender differences in alcohol consumption.

Finally, at phase 3 alcohol consumption across the sample as a whole had further reduced, but the mean score was still within the hazardous category. The gap in AUDIT score between people playing sport and those who were not had also reduced further due to the reduction in alcohol consumption by sports participants. However, it is worth noting the percentage of participants involved in sport had dropped substantially from phases 1 and 2. This could affect the quality of the data analysis as there are two few participants to generate sufficient statistical power (Rice & Harris, 2005). The reduction of alcohol consumption further connects to the phenomenon of maturing out, which suggests that added life responsibilities lead to a reduction in alcohol consumption (Vik et al., 2003). Sport participation is also know to decline as individuals' age (Basterfield et al., 2016), something that was seen in the current study. Interestingly, at phase 3 there was a significant difference between female participants and male participants in their alcohol consumption with the former consuming more than the latter. This finding is worthy of note, as the last significant UK study found consumption in male and female participants rose comparably (Newbury-Birch et al., 2001).

To summarise the key findings from the longitudinal investigation, it appears that sport participation remains influential on alcohol consumption even at over 2 years post-graduation. Finally, there was an overall decline in alcohol consumption 28 months post-graduation, i.e. some evidence of 'maturing out,' however typical alcohol consumption was still hazardous. Despite greater reductions in alcohol consumption in sports participants compared to their non-sporting peers, sport participants still

reported drinking at higher levels of consumption than their non-sporting peers two years post-graduation.

4 A longitudinal series of interviews

4.1 Introduction

The baseline stage of study one showed that students were drinking at hazardous and harmful levels, as measured on the AUDIT, with a mean score of 11.03 (SD = 5.86, range 0-40). Findings also highlighted the relationship between sports participation and increased levels of alcohol consumption whilst at university. When looking at the longitudinal data relating to drinking, it was found that with progression across the three phases, there was a decline in the average AUDIT score of participants. However, the mean AUDIT score for the sample remained in the hazardous category even two years' post-graduation. In addition, the association between sports participation and increased alcohol consumption that was identified at phase 1 was still present at phases 2 and 3. These findings indicate that students are drinking at harmful and hazardous levels whilst at university and continue to do so up to 2 years following graduation. Of interest, is the finding that student-athletes seem to be particularly at risk of engaging in hazardous drinking at university and continuing to drink at hazardous levels beyond graduation. If interventions are to successfully address the concerns around this specific at risk group, then it is important to understand the motivations and the decision-making processes of student athletes concerning their alcohol consumption both during their time at university and in the two years following their graduation.

A particular shortcoming in the current evidence base on drinking motivations is the under-representation of qualitative research. There are numerous studies that have used a quantitative approach to analysing drinking motivations (Kairouz,

Gliksman, Demers, & Adlaf, 2002; Padon, Rimal, Jernigan, Siegel, & DeJong, 2016; Rutledge & Sher, 2001; Stewart & Power, 2002). However, there are relatively few qualitative studies, with a recent review only including one qualitative investigation from sixty-six included in their analysis (Kwan et al., 2014). This particular investigation took a mixed methods approach and used interviews to understand student athletes' motives for consuming alcohol (Martin, 1998). Additionally, over the past decade, there have been frequent calls for further longitudinal investigation of drinking in students in order to better understand the long-term impact of hazardous drinking and to observe how students' drinking patterns change with time (Olthuis, Zamboanga, Martens, & Ham, 2011; Zhou, O'Brien, & Heim, 2014).

The call for more longitudinal research is in part due to awareness of the concept of maturing out (Dawson, Grant, Stinson, & Chou, 2006; O'Malley, 2004). This phenomenon has been observed in the majority of drinkers and is characterised by a reduction in alcohol consumption as the individual reaches adulthood (O'Malley, 2004). There are two key life transitions that have been shown to have a significant effect on reducing alcohol consumption, these are, getting married and having children. These life events are the key stages for maturing out of heavy alcohol consumption to occur (Dawson et al., 2006; O'Malley, 2004). However, there has been some suggestion in the literature that although there is evidence of 'maturing out' in heavy drinking young adults and adolescents, the extent to which maturing out results in low risk drinking is not clear (Lee M. R., Chassin, & Villalta, 2013). This is due to the greatly elevated level of alcohol that was being consumed by these individuals prior to maturing out. As students who participate in sport are one of the heaviest drinking subsets of young adults (Heather et al., 2011) they are of particular interest in terms of their experience of the maturing out process.

The purpose of the current study was to gain a better understanding of the motives that shape student athletes' decision-making with regard to drinking behaviours. A specific aim was to explore how these motives may change over time, particularly following graduation from university.

There are several theories that are frequently adopted to try and explain alcohol consumption including motivational theories, alcohol expectancy theory, theory of planned behaviour (TPB) and the prototype willingness model (PWM). While all of these theories have a common goal in terms of understanding why people drink in a certain way, their approach to explaining this behaviour differs. Alcohol expectancies are the beliefs held by drinkers about the perceived outcomes of drinking. Positive outcome expectancies are beliefs held by drinkers that engaging in various types of drinking behaviour will result in a positive outcome for the individual. A significant amount of research has been dedicated to the notion that expectancies are associated with subsequent drinking behaviour (Blume & Guttu, 2015). TPB was developed over 20 years ago (Ajzen, 1991) and has been extensively used to explain health-related behaviours, including alcohol consumption. The key factor of this model is that it proposes the most important determinant of behaviour is a person's intention to perform said behaviour (Cooke, Dahdah, Norman, & French, 2016). A recent investigation into TFB's efficacy for use in alcohol research demonstrated support for its continued use (Cooke, et al., 2016). Compared with these other models of behaviour, the PWM is a much more recently established model. It has been suggested that using dual-process models like PWM enhances our understanding of decision making, allowing for the examination of both heuristic and analytic reasoning (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008).

When examining drinking motives our understanding is predicated on the theory that individuals are motivated to drink in order to attain a certain valued outcome, and that these valued outcomes are reasons for a particular behaviour (Kuntsche, Knibbe, Gmel, & Engels, 2005). Drinking behaviours fulfil certain needs and serve specific functions to an individual (Kuntsche et al., 2005). For example, people may use drinking as a coping strategy to deal with perceived stress or a stressful situation. This differs from outcome expectancies, which is another metric used to examine how behaviour is determined (Longstaff et al., 2014). Outcome expectancies explain behaviour in terms of the expected outcome of drinking alcohol. Through experience, either direct or indirect, individuals develop beliefs about the effects alcohol will have on their behaviour, mood and emotions. Outcome expectancies can either be positive ("I expect that engaging in drinking will help me have an enjoyable time") or negative ("I expect that going out drinking will make me feel awful tomorrow"; (Jones, Corbin, & Fromme, 2001).

Drinking motives are an individual's perceptions regarding what causes them to drink and these can be either facilitative or inhibitive depending on the individual's valued outcome for a situation (White, Anderson, Ray, & Mun, 2016). They are also influenced by an individual's overall attitude to alcohol consumption, for example, individuals who have a negative attitude to alcohol consumption from either their upbringing or experience will place different value on drinking in certain contexts (Hansen & Hansen, 2016). From this understanding, the motivational model of drinking behaviour is derived (Kuntsche et al., 2005). The motivational model is based upon the assumption that a person makes a decision about whether or not he or she will consume alcohol. This decision is a combination of emotional and rational processes and the decision is made based upon what an individual expects to achieve by drinking

compared with not drinking. This “affective change” can either be a result of the direct chemical effects of alcohol, e.g. mood enhancement, or the indirect effects, such as social acceptance. With this in mind, an individual does not have to be aware of making a decision to drink or the factors affecting this decision. Often, decisions about drinking are made automatically and could be deemed as unconscious decisions (Kuntsche et al., 2005). A visual representation of the motivational model can be seen in Figure 5 below.

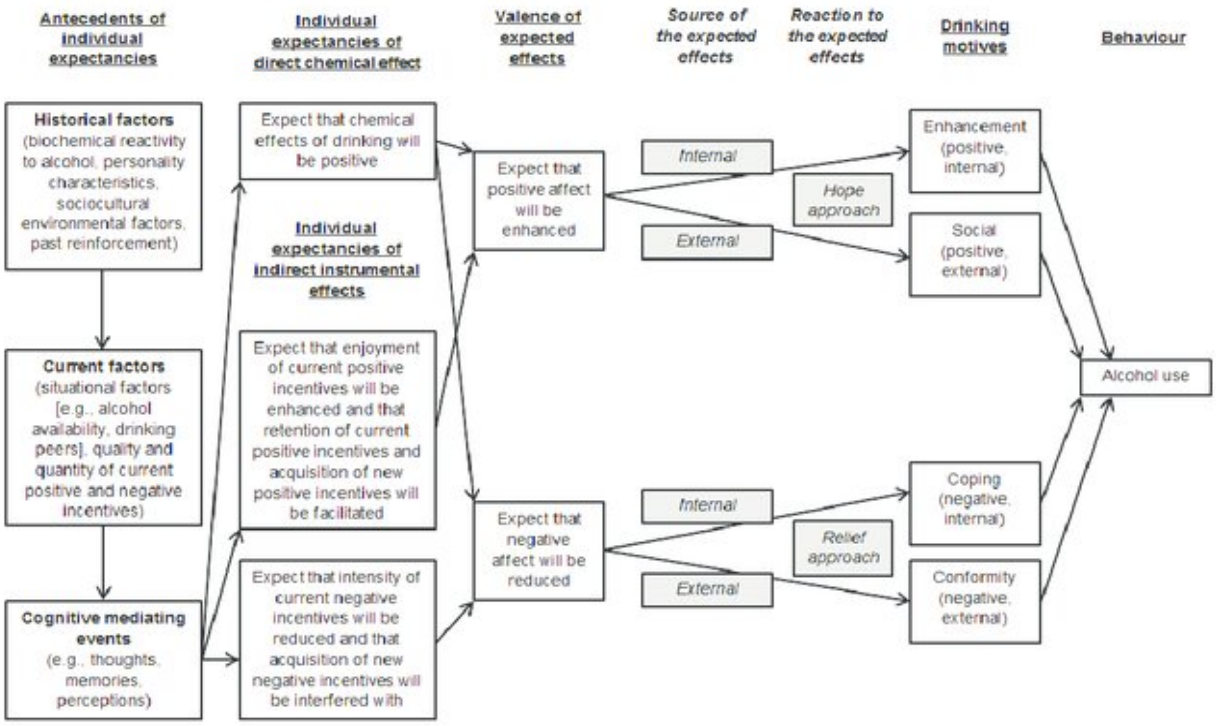


Figure 5 Antecedents, alcohol expectancies, drinking motives and alcohol use according to assumptions of the motivational model of alcohol use (Kuntsche et al., 2005)

4.1.1 Student Drinking Motives

Cooper (1994) identified four categories of drinking motives that can be used to explain drinking behaviour in young people; drinking to enhance positive mood or well-being (Enhancement), drinking to obtain social rewards (Social), drinking to attenuate negative emotions (Coping) and drinking to avoid social rejection

(Conformity). These 4 factors have informed a large proportion of research into drinking motives including Kuntsche's work. As with consumption patterns, drinking motivations have been shown to change across the life span (Kuntsche, Knibbe, Gmel, & Engels, 2006). During early adolescence and into young adulthood drinking for social rewards, or more broadly drinking for social motives, is the most common motivation amongst drinkers, although coping motives are also relatively common (Kuntsche et al., 2006). As individuals move through adulthood there appears to be a shift away from social motives and a shift towards coping motives (Mezquita et al., 2011). It has been suggested that this is in part due to the increased knowledge of the stress relieving properties of alcohol consumption (Mezquita et al., 2011).

According to research, students tend to have similar drinking motives to those in late adolescence, with social motives being the most common motivation for alcohol consumption, specifically, the associated social rewards (Kunstche et al, 2005). When considering student athletes, the most common motives identified were social rewards (e.g. drinking to enhance their social standing within a group) and enhancement of mood (Taylor, Ward, & Hardin, 2017). Interestingly participants in individual sports have been shown to score higher than those playing team sports on both mood enhancement motives and conformity motives (Taylor et al., 2017). This could be due to the fact that a large proportion of their interaction with other athletes will be away from training.

While there is evidence to confirm the existence of each of these four categories of drinking motives, the majority of research on drinking motives in students has focused on the first three categories (Kuntsche et al., 2005). There is a deficit in the literature in both student drinking and student-athlete drinking with regards to the importance of conformity as a motive for alcohol consumption, with few studies

investigating its importance as a factor. A study conducted in the Netherlands found that popular peers did have an influence on drinking norms of adolescents, particularly when look at abstinence (Teunissen et al., 2012). Furthermore, little of the existing literature on drinking motivations in students, in both student athletes and the wider student population, has been conducted outside of North America (Kuntsche et al., 2005, Taylor et al., 2017). As such, it is important that research be conducted outside of this region to investigate any potential cultural differences that could influence motivations for alcohol consumption. For example, differences in legal drinking ages and the relative cost of alcohol.

One study conducted on a UK student population identified social motivation as the most prevalent motivation for drinking in UK students, while also finding enhancement motives to be a strong predictor of drinking behaviour (Atwell, Abraham, & Duka, 2011). However, this investigation did not include sporting participation as a variable. Fernandes-Jesus & colleagues found that Cooper's model and associated questionnaire was valid in studies from several different countries and that students mainly give external reasons for their alcohol use (Fernandes-Jesus et al., 2015). Currently, little is known regarding the drinking motives of UK student-athletes.

When considering motivations to drink it is also important to consider motivations to abstain or limit alcohol consumption. Indeed understanding abstinence could play a role in shaping drinking behaviour at university and beyond. Conroy and de Visser (2013) observed that abstinence from heavy drinking as seen as something strange, requiring further explanation and that it possesses greater negative social consequences for men. Understanding motives to abstain from drinking is important in light of the negative social stigma that can be attached to it. Previous research has broadly categorised abstinence motives, sometimes referred to as RALD (Reasons

for Abstaining or Limiting Drinking), into two categories (Epler, Sher, & Piasecki, 2009); reasons relating to loss of control/negative consequences (e.g. avoiding hangover) and reasons relating to personal convictions (e.g. believing heavy drinking is wrong). Epler and colleagues (2009) determined that reasons relating to personal convictions were much more likely to result in a change in drinking behaviour than those related to negative consequences. However, it is also likely that these reasons are instilled in individuals from a young age and usually result in the prevention of problem drinking (Epler et al., 2009). Students who are heavy drinkers are more likely to experience reasons relating to loss of control and negative consequences of drinking and as a result these may have less of an impact on moderating drinking behaviour both at university and beyond (Epler et al., 2009).

To date, research into drinking motivations is limited to cross sectional work. Given that the cross sectional studies indicate that drinking motives do indeed differ at different points in the life span, longitudinal research into drinking motives is warranted in order to better understand how, when and why changes in drinking decisions take place. It is the aim of this study to address these gaps in the literature with a view to better understanding the drinking motives and resulting drinking behaviour of UK university students during and post-graduation. Of particular interest is the role that sport participation may play in influencing drinking decisions over time.

4.2 Methods

Please see chapter 2.2 for further details.

4.3 Results

Before discussing the themes, the context is set via a description of the drinking behaviours of the students at each of the three different phases. Following on from this, each of the key themes are discussed. The first theme is drinking motives. This theme is discussed in line with established theories of drinking motivations. Several barriers to drinking emerged from the data and this theme is discussed next. Following these barriers, the impacts, both negative and positive, of drinking behaviour are considered. Finally, broader attitudes towards alcohol are disused. Within each of these discussions, the viewpoints of participants are considered at each of the 3 phases to see how perceptions change.

4.3.1 Describing the Drinking Behaviours

4.3.1.1 Baseline (Phase 1)

During their final year at university, all of the participants were going out at least once a week. Several of the participants were going out and engaging in heavy drinking multiple times across the week. As can be seen in Table 5 all participants scored hazardous or above in relation to their drinking behaviour.

> ***Katy:*** *This year, it's been quite a lot more and still every Wednesday, Thursdays and maybe a Saturday or Monday too.*

Drinking activities tended to involve "pre-drinking" at home or at a friend's house where cheap wine and spirits were consumed. Pre-drinking is a widespread phenomenon observed cross culturally (Kuntsche & Labhart, 2013) and is characterised by the consumption of alcohol prior to leaving for a night out. There have been clear links established with socio-economic status with individuals who have less

money more likely to engage in pre-drinking (Kuntsche & Labhart, 2013). The financial constraints faced by many students could certainly place them in this category.

> ***Lucy**: we used to drink in our flat before, and that used to be maybe a bottle of wine or sort of half a bottle of vodka. And then when I was out I didn't tend to drink when I got out that much, maybe like two double vodka and lemonades or something but that was it.*

These pre-drinking events were usually followed by trips to bars and clubs offering low cost alcohol and trebles deals. Students tended to drink with friendship groups on most days of the week with Wednesday drinking being largely restricted to socialising with teammates on sports nights out.

> ***Billy**: Wednesday, Wednesday. Every Wednesday yeah, 100%. Yeah erm and then probably a Saturday.*
>
> ***I:** Ok*
>
> ***Billy**: Just with Wednesday being sports day I guess.*

4.3.1.2 Phase 2

At phase 2 (18 months after graduation), many of the participants were still engaging in weekly heavy drinking, with AUDIT scores of hazardous or above, however, no one reported regular multiple weekly outings. Instead they were consuming nearly all of their weekly alcohol intake in one sitting, typically at a weekend. Existing longitudinal research looking at medical students demonstrated an increase in weekly binge drinking following graduation (Newbury-Birch et al., 2001). This was also the case at phase 3 in the current study (30 months after graduation).

Whilst at University the type of drinks consumed were dictated by cost, with students generally opting for cheap alcohol. Following graduation, cost was less of factor when determining drink choice. Additionally it seems although by the later phases, the motive was not usually to “get drunk” they were still doing so. This suggests that enjoyment is linked to the feelings associated with the sensation of being drunk, something that has been noted in previous research (Comasco, Berglund, Oreland, & Nilsson, 2010).

> ***Ellie****: I’d rather go out to enjoy the drink rather than just to go out and get drunk, so then I would just…I would maybe have like a couple of cocktails … so last week we didn’t really plan it, we just thought right we’ve finished the residential let’s go for some food and a drink and then about four bottles of Prosecco later between the three of us it was one o'clock*

Following graduation, at phase 2, drinking still took place within friendship groups. However, the composition of the groups evolved over time. At the second phase of data collection, participants were at a transitional phase in which they were drinking with two or three different social groups. One group was their old university friends or friends from childhood that they had maintained contact with. They were not seeing these friends as regularly as they had previously, but did meet up with them for specific social occasions, in particular celebrations or landmark events.

> ***Ellie****: Yeah more social [yeah] so the last kind of couple of times has either been for a hen party [ok] for like meeting up with friends that we haven’t seen for a while [yeah] so this weekend we went out for a friend’s birthday with people from home that I haven’t seen for a while*

The other group was new work colleagues. For some participants this new group became very central to their drinking activities.

> ***Sean****: probably more so again friends but I've become quite friendly with the people I work with also so like I said the past three Fridays I've been out with people from work.*

For those still involved in sport, their sports teams constituted a third drinking group. Drinking in this group ranged from casual drinking after games to much heavier drinking, similar to the type of drinking that they engaged in while a student.

> ***Sean****: I mean after…after every game the team will go back to the bar and a lot of the boys'll have a couple of beers*

4.3.1.3 Phase 3

By phase 3 drinking was predominantly taking place with work colleagues. Alcohol consumption for the group had largely stayed the same however; two participants had increased their consumption slightly. In some instances, participants described social drinking as something that was beginning to mirror the routines of university drinking, meeting for "pre-drinks" at an individual's house or at work before moving onto bars and clubs.

> ***Katy****: Yeah, so usually it starts in the office. We finish at five on a Friday, so usually they'll get the beers out at about four in the office, but for some reason, Friday afternoon always just get really busy, so I only have about one beer, or cider, or one glass of wine, or whatever it is.*

For those who were still involved in sport at this point, their sports team remained an important drinking circle. Interestingly these drinking circles did not seem to mix. Participant 7 suggested it was one group or the other.

> ***Dina**: If I do go out like it's usually either work or uni friends (teammates) will all get together, usually in Leeds and go out or somewhere further from home.*

While the overall themes were consistent across the three phases, within the broader themes, there are some key differences between each phase. This can be visualised from the coding trees from each phase (Appendix vii).

4.3.2 Motives

4.3.2.1 Year 1

In their final year at university, several drinking motives were evident. These motives took a number of forms from overt beliefs to subtler external influences, such as peer pressure/ conformity. Participants perceived these motives as the main reasons behind their drinking behaviour however as described by Kuntsche and colleagues (2005) these motivations need not be conscious at all. When analysing the data, the most important and the most prevalent motive was social. Participants were motived to drink in order to obtain social rewards. This finding supports work that has been observed elsewhere (Kuntsche et al., 2006). Alcohol formed a key part of every participant's social experience and the perceived enjoyment of social situations seemed to go hand in hand with the consumption of alcohol. Below are some of the examples of the participants' views on the relationship between socialising and alcohol consumption.

***Rochelle**: "It's if there's a good group of you going, even if there's say two or three, as long as you know you're going to have a good laugh with them, then it's... it's usually just going out to have a laugh with people."*

***Jade**: "I think it's probably mostly social…… I think because it was social because everyone else was and when you go out you tend to have a drink.."*

***Ellie**: "Just sort of a social thing, coz obviously I worked quite a lot so that was my chance to kind of go right I'll have some time with whoever. And also because mainly sort of occasion based, it was sort of to celebrate something or to see someone, or whatever."*

Several participants commented on the fact that simply being involved in sport had increased their motivation to drink and resulted in them consuming alcohol. This behaviour seems to be due to social motives.

***Billy**: "Saturdays we'd have had a training session. Probably 10-12, you take your clothes with you, then 12, half 12 you showered at the club, you were all together. "Oh, should we go to the pub? Rugby kicks off in half an hour," so you know from September through to say May, those months were filled with alcohol on a Saturday because of the rugby that was on."*

***Katy**: "I think if I hadn't joined a sports team, I wouldn't probably go out nearly as much."*

It is no surprise that there is a strong association between socialising and alcohol consumption amongst participants. Previous research has clearly established that the most reported motive for drinking amongst young people is "social reasons"

(Lee C. M., Geisner, Lewis, Neighbors, & Larimer, 2007). One interesting difference with the current data is that typically social drinking is a characteristic of moderate drinkers. The sample for this study was comprised of heavy drinking students. In previous literature, heavy drinkers have been found to be more likely to state enhancement motives to justify their alcohol use, for example enjoying the feeling that comes with having a drink (Leigh J. & Neighbors, 2009). This previous literature looks at the wider student population rather than student-athletes specifically, and this may be the reason for the discrepancy. For example to be social as a student-athlete, you have to drink heavily as the other members of your group are also drinking heavily. This could also link to conformity. Where research has been carried out on student-athletes, the majority has looked at student-athletes from the USA (Gill, 2002). There may be some important cultural differences between these groups with regard to their drinking behaviour such as age of onset and gender differences, something that has been highlighted in previous research (Wilsnack, Vogeltanz, Wilsnack, & Harris, 2000).

Another significant motive identified by participants was conformity, specifically, the influence of peer pressure. At phase 1; participants felt an element of pressure to consume alcohol in order to make friends, be accepted within a social group and to be invited to social events i.e. to avoid social rejection, which is a typical hallmark of conformity. All of the participants mentioned this as a key motive when considering their alcohol consumption. Some examples are illustrated in the quotes below.

> ***Lucy**: "It was a very big part, because if you didn't drink and you didn't go out then err you sort of wouldn't be. I don't know because everyone did that, you*

had to sort of be in with the crowd and if you didn't do that then you looked a bit like "that's a bit odd" I might not have made as many friends"

***Rochelle**: "I think to kind of have that 'Uni experience' and trying to be part of it; not like fit in but feel like you're part of something and making friends. I think that was it. I was going out to find something."*

The above quotes demonstrate examples of indirect peer pressure and fear of rejection which was something highlighted by all of the participants. This indirect peer pressure takes the form of social expectations that are perceived by the individuals in question. While no one is explicitly demanding that they engage in heavy drinking, they feel pressure to drink heavily in order to be accepted into the group. This is something highlighted in the literature as being a key factor in university groups, including student-athletes, who often over exaggerate their drinking to match peers (Thombs, 2000). The majority of the participants also discussed examples of direct peer pressure.

***Katy**: "if you say even before we play the game that you're not going out or you don't want to go out, by the time you've got home or finished where we have tea afterwards, you'd probably be going out because they'll probably persuade you to go out."*

***Dina**: "because I was in halls and there was a lot more people out, so it was more about in terms of, it was like other people were going out you'd be like yeah. But I'd say no and people were like sort of encouraging keep going on until you said yes."*

***Billy**: "if it were someone's birthday in the rugby team who everyone kind of goes "Are you going out? If you go out I'll go out". So then there's, you may have a squad of thirty lads and 26 would go out because everyone else is going out."*

These examples of peer pressure are of particular interest as although some previous studies have commented on the motivation to avoid social rejection (Taylor et al., 2017), the review by Kuntsche et al. (2006) highlighted that it is an often-neglected area of research. Excessive alcohol consumption is seen as key to acceptance within the "jock culture" in athletes (Sparkes, Partington, & Brown, 2007). Even athletes not involved in the first team were expected to conform to group norms regarding alcohol consumption. When considering the data from this study it lends support to the notion that the conformity motive should be further investigated in relation to student populations, particularly student-athletes.

The perceived trade-off between social acceptance and academic performance is an area that could also be explored further. For example, participant nine commented on the fact that her need to feel part of the group and avoid social rejection was more important to her than her overall degree classification.

***Rochelle**: "I would rather be happier with a 2:1 than feeling like I missed out on something (social) with a First."*

Another way in which the peer pressure led to increased alcohol consumption was in relation to buying rounds. For example, participant five below discussed how he felt that the need to return the favour of a drink purchased for him, led to a greater consumption than he would have liked. This pressure to reciprocate the giving of

alcohol has been observed outside of student populations previously and is seen as a barrier to reducing alcohol consumption (Cherrier & Gurrieri, 2014).

> ***Sean**: "Going out, I probably stuck to beer for most of the night and then maybe, towards the end of the night, you might have had a few vodkas or Bacardi's, in my case, but that would have been more due to the company that I kept because they would be doing that. It was sort of like they were buying you one and then you felt like you had to buy them one back."*

Peer pressure was also linked to competition within sports teams as evidenced by the following quote from participant 4.

> ***Billy**: "there's always the 'I've got to out-drink him' or you know you play drinking games on the bus or you know your intention probably, especially the...I can't think of the word...erm expectations of the rugby team itself are I guess the pressures that the lads feel that they have on them."*

Competitiveness has been linked to increased alcohol consumption in several studies on US collegiate athletes (Serrao, Martens, Martin, & Rocha, 2008). Serrao and colleagues (2008) suggested that higher levels of competitiveness are related to increased alcohol consumption in both recreational and elite athletes and also amongst non-athletes. However, the fact that the only positive correlations found in athletes were between competitiveness and heavy episodic drinking suggest that athletes with high levels of competitiveness are more prone to drinking large amounts of alcohol in single sittings. This could be linked to the social status gained from

“beating” their peers in their alcohol consumption (i.e. drinking a greater volume or drinking faster than their peers).

Overall, it can be seen from the data what a large part peer-pressure plays in influencing these participants to drink whilst at university. The age group of the participants may well play a key role in this as conformity motives such as peer pressure have been shown to be a key motivational factor in alcohol consumption in adolescents and young adults (Studer et al., 2014). However, some studies have suggested that peer pressure plays less of a role in students who are towards the end of their degrees (Ferrer Rebecca A, Dillard, & Klein, 2012a), an observation not matched here.

Additionally, membership of a university sports team was linked to experience of peer pressure both direct and indirect i.e. conformity motives. This is supportive of the idea that student athletes are at particular risk of harm from alcohol use (Perkins, 2002). The following quotes are typical of the indirect expectation placed on student athletes to be involved in the drinking culture surrounding university sport.

> ***Lucy**: “Wednesday nights in particular. Err was sports night and it was sort of like you have to go out on like Wednesday nights if you’re part of a team.”*

> ***Sean**: “I think the social convention is that after a game, or maybe on a Saturday night, teams do go out and drink”*

This pressure is also observed in a more direct capacity with participant 8 observing that people often ask if they are coming out and by doing so place pressure on them to comply.

***Katy**: I think joining the team is probably the best thing I've done at university and also you get to know other people and sports teams as well and become friends with them. They are then saying, 'Are you coming out?' So it's not just your own team; it's other sports people as well.*

Those participants involved in playing sport, felt that their sport involvement was a key factor in terms of their alcohol consumption. Previous literature has proposed a number of factors, which might explain why a drinking culture exists within sport, especially amongst student athletes. These include factors such as coping with stress, mood enhancement and personality differences (Brennan, Walfish, & AuBuchon, 1986; Wilson, Pritchard, & Schaffer, 2004). While there were no direct links made between sporting participation and these factors by the current participants, there was mention that the increased stress of final year was a factor for some in terms of engaging in drinking, i.e. coping as a motive for drinking.

***Jade**: "And I think when it got to 3rd year it was more work related, so it was to have a break rather than to just be social about it …. it was more like to have stress relief "*

The final key motive that students discussed was to use alcohol as a means of "blowing off steam", escaping the pressures of university life, and celebrating academic success. This could be seen as a coping or enhancement motive however, drinking to celebrate with friends is usually seen as a social motive for alcohol consumption (Kuntsche et al, 2005).

***Rochelle**: I think with celebrating as well; I think when you've done well, I want to go out and do something.*

This is very similar to the findings of Kuntsche et al. (2005) where heavy drinkers were typically found to drink for mood enhancement purposes. Seven of the nine participants mentioned these motives being a key reason why they engaged in alcohol use. In addition, participants explained that they drank following periods of perceived heightened stress such as after assignment hand-ins. This appears to be used to enhance positive mood following the hand in, rather than as a coping strategy during the stressful work period.

> ***Alan**: We were, as soon as it got into Christmas time it were the countdown then we had 6 more assignments in and then it were 5 and it was a big countdown until the big one which were the dissertation hand in and that took up more than one big night, that were a few big nights after that.*

> ***Lucy**: "think most hand-ins, err, whenever we handed in like an essay or especially dissertation, there was a big night out after we all handed in our dissertation. Err but generally most hand-in dates even if was just like an essay people would go out."*

These reasons seemed to differ slightly from those stated when participants talked about drinking during the earlier years of their studies. Often when students were asked to reflect on their motivations from the early stages of their university life, participants suggested that the novelty of being able to go out and drink with friends and peers was exciting and that it was less focused upon celebrating the completion of academic work and deadlines. The following quote from participant 8 highlights this emphasis on social motives.

***Katy**: "I think at first, I was a Fresher and I was new to the Wednesday thing. I wasn't really used to going out with loads of sports people, so at first, I think it was just because I found that new, exciting and fun."*

While this type of behaviour was reported less by the time of their final year there were still instances of enhancement motives at play. Participant 6 discussed this in some detail highlighting the fact that she didn't settle into the university environment until quite late in her studies and as she became more comfortable she engaged in more social drinking.

***Ellie**: "I went out more towards the end of first year than what I did at the beginning. And then I seemed to go out more frequently, as I kind of progressed through Uni, as I became more comfortable with it and kind of the people I was around and things like that so, I kind of did things backwards (laughs). Sensibly but backwards."*

***Ellie**: "Yeah like frequency. Quantity has always sort of been the same, but because it was a completely different, like I came to Uni just on my own, like I didn't have anyone that I knew beforehand, so as soon as I kind of got comfortable with people in that kind of environment, then it was more frequent than it was."*

Although not specifically discussing alcohol dependence, two participants mentioned behaviours that could be viewed as potential warning signs for more serious alcohol issues. For example, one participant discussed the fact that the Wednesday night drinking events were an opportunity for very heavy drinking to be viewed as socially acceptable, which might not be the case in other contexts. The

other talked about wanting to have a drink because they had not yet had one that day. Both of these participants were amongst the highest scoring on the AUDIT, with scores of 19 and 23, placing them in the harmful and probable dependence categories respectively.

> ***Katy**: "You learn as it goes on that it's more acceptable to get as drunk on a Wednesday. People know they're drunk but they'll still carry on drinking. They won't say, 'Enough now' and they'll still keep going, if you know what I mean."*

> ***Alan**: "Or whether it were just cause everyone just wanted a beer cause they hadn't had one all day."*

4.3.2.2 Phase 2

As the participants transitioned away from university, some of their drinking motives changed but others remained the same. Interestingly the social aspects associated with drinking were still a key motive 18 months following their graduation. All of the participants who were interviewed at phase two identified social drinking as the primary motive within which they were consuming alcohol at the time. Below is an example of alcohol being consumed socially during planned gatherings. The purpose of these wasn't always explicitly to drink to get drunk, rather there was more of a focus on "catching up", however, participant 5 highlighted that drinking tended to take place.

> ***Sean**: "if I'm completely honest the majority of social occasions, particularly in the evening, would involve you know alcohol, where it be a couple of beers or you know possibly more on a longer night out [yeah] so yeah I would say…I'd say it had a pretty big…big effect on what we did and where.*

Participant 1 highlighted that alcohol was often consumed when catching up with pre-existing friends outside of the sporting environment. Previous research has demonstrated that if alcohol consumption forms a key part of a group's social activity it will likely continue to do so (Cheadle & Williams, 2013).

> ***Jade**: "I guess seeing friends was probably the biggest motive 'cos obviously I would see them in kind of training, the training atmosphere but it's not like you can kind of talk and things like that and really chat and socialise so it was probably just to socialise with other people"*

Following graduation, when participants found themselves in new situations and potentially away from their established drinking groups, alcohol was used to increase feelings of confidence when meeting new people (enhancement motive). This is highlighted in the following quote from participant 2. In this context alcohol is now being used to enhance confidence (enhancement motive), in order to be better able to obtain social rewards (social motive).

> ***Alan**: "I probably socialised more with alcohol involved, I think it give you a little bit more confidence in socialising with different people. I don't think obviously the groups that kind of come out these were…in terms of socialising this is in terms of the group I was kind of going out with this is in terms of people who you didn't really know and having a little bit of a conversation with different people. I just think it give you a bit more confidence when you've got…when you've had a little bit of a drink.*

Participants 1 and 2 talked about how they used alcohol to socialise with friendship groups from new university courses and new jobs. This is very similar to the

way in which participants seemed to use alcohol to gain social acceptance while they were new students or new to university sports teams. Alcohol is often used as a facilitator for new social interaction (Cheadle & Williams, 2013). The perceived social benefits of alcohol have been reported on in several papers looking at adolescent and university age drinking (Kuntsche, et al., 2006) so it is interesting to see this motive continue past these age groups when graduates are faced with new social situations. Most research in older adult populations has focussed on coping motives such as stress relief as a key motivation for drinking (Jennison, 1992; Naimi et al., 2003), however it appears that for these participants, alcohol is also used to cope with the potential anxiety of new social situations (coping), by bolstering confidence (enhancement) and thus gaining desired social relationships (Social). This interaction of motives is a particularly interesting finding as few studies have reported interactions between drinking motives (Thrul & Kuntsche, 2016).

As has been mentioned previously, social drinking motives are most commonly associated with moderate drinkers (Kuntsche et al, 2005). This is a better fit with the sample at this stage as half of the sample were now classified as low risk drinkers (AUDIT score < 8). Of the four who were deemed low risk at this point, three had previously been categorised as hazardous with the fourth categorised as harmful.

One of the biggest changes when comparing phase one data with phase two is that there is considerably less directly perceived pressure to drink at phase two. During phase one; this conformity motive was one of the strongest motives to engage in drinking. In contrast, at phase two participants had experienced very little direct pressure to drink. In fact, the only instance of direct peer pressure perceived by a

participant was by participant 1. Specifically, she encountered this while socialising with teammates who were still students.

> ***I**: "Was it the students driving those nights out or was it just kind of a mutual thing?"*
>
> ***Jade**: "Probably the students yeah, definitely the younger ones!"*

When speaking with the participant 18 months post-graduation-it is interesting that this perceived peer pressure is only present when mixing with friends who are still students. Firstly, the lack of direct peer pressure across the sample suggests that conformity is a strong motive for drinking when in the university environment, but much less significant away from the university context. Secondly, it also suggests that returning to this environment, even after having been removed from it for some time, can trigger it to become a motive for drinking behaviour again. This is consistent with previous research on the role of alcohol in friendship groups (Cheadle & Williams, 2013).

Sport remained an important factor in participants' decisions around drinking for those who were still active in sport during phase two of data collection. Only four of the eight participants involved in the study at this point were actively involved in sport, with the others having stopped taking part for a number of reasons, such as work commitments or relationships. Participant's 4 and 9 were still playing rugby, while 1 and 2 were still actively involved in sport playing jiu-jitsu and football respectively. For those still playing sport, social drinking motives were still evident. Participant 2's involvement in football was at a local level and alcohol consumption seemed to play a big part in the match day routine.

***Alan**: "they kind of did still have that social aspect, I mean the team that I played for played Saturday afternoons at 3 o'clock and every time when we'd finish a game at 5 o'clock we'd go back to the pub and we'd get food on and obviously everyone'd start having a few drinks"*

Participant 4 was one of the rugby players from the original sample. He had continued to play at semi-professional national level competition following his graduation from university. Despite this high standard of play, many of the drinking behaviours that he engaged in at university were still an important part of his involvement in the sport.

***Billy**: "Game day was a Wednesday at University; so the same procedure would happen on a Wednesday evening, as it would as a Saturday once I graduated."*

Alcohol has a well-documented association with participation in rugby at all levels (O'Brien et al., 2005). O'Brien and colleagues (2005) in a study of alcohol consumption in rugby players at provincial and international levels found that hazardous levels of alcohol were regularly consumed by their participants. For participant 4, alcohol was still consumed. Initially this took place at the club following the match. Drinking then continued at venues in the city. The only change to his drinking at phase 1 was that at phase two this took place at the weekend instead of a Wednesday night.

***Billy**: Yeah, it was very much social; so whether it be the full 20 or just a group but it would be within that social group, whoever you played rugby with.*

Drinking to alleviate stress and pressure from daily life was another motive that was present following graduation. This can be viewed as a coping motive. Some of the participants went on to further study and the increased demands of post-graduate study seemed to have a bearing on these participants' motives to drink. Participant one discussed the pressures she faced on her PGCE and stated that having a drink with friends helped her escape those pressures. Alcohol has long been linked to stress relief and tension reduction (Lee N. K., Greely, & Oei, 1999) and it is not surprising to see it used in this way here. Indeed, recent research has highlighted the role of alcohol consumption as a coping motive in people experiencing high levels of stress (Corbin, Farmer, & Nolen-Hoekesma, 2013).

> ***Jade**: "it was a bit different when you were on a PGCE it was more like you were going out to…to like get a release kind of thing and see your other friends and things like that."*

Many of the participants involved in phase two had not gone on to further study. These individuals were no longer motived to drink in order to cope with the typical stresses of student life such as exams and assignment hand-ins. However, coping was still a key motivation for them to drink. In this case, it was to help them to forget the pressures of the working week. In addition to drinking in order to attenuate negative mood (coping motive), this could also be seen as drinking to enhance positive mood and wellbeing (enhancement motive).

> ***Alan**: "I think the motives were really just to kind of relax a little bit and actually have a drink and I could kind of chill out and zone out from work."*

While alcohol use is frequently linked to relaxing and having a “good time” there is a wide range of literature stretching back over several decades that highlights the risks of stress related alcohol consumption (Sadava & Pak, 1993). Studies have pointed to this type of behaviour being a risk factor for the onset of depression and other anxiety based disorders (Sadava & Pak, 1993). While it is impossible to determine if any of the participants in this study are likely to fall into these risk categories, the fact that many of them discussed coping as a key drinking motive is a potential cause for concern.

To summarise the main findings at phase two, social and coping motives were still present amongst the majority of participants. These social motives differed slightly depending on the drinking circle of the individual in question. For some it was part of a long-standing social convention with old friends, often from university. In this instance, the motives for drinking were to gain social rewards (social motives) and for enjoyment (enhancement). For others it formed the basis of new social interactions where it could be argued that the main motivation to drink was for enhancement motives, particularly confidence, in order to be able to interact effectively in the new social setting (coping) and to ultimately gain social rewards (social motive). Other studies trying to predict alcohol consumption in sports people have observed individuals reporting perceived approval from peers around this type of social drinking (French & Cooke, 2012). It is interesting to see here how interactions between the different motives are shaping drinking behaviour.

The influence of direct peer pressure had disappeared from the perceptions of the participants involved in this study although some still reported indirect, expectancy related pressure in certain contexts, either when drinking with work colleagues or with

teammates. This was especially true of the participants still involved in sport. Finally, some participants also reported drinking for coping motives. These individuals were using alcohol as a way to relieve stress accrued from their working lives.

4.3.2.3 Phase 3

In the final phase of data collection, social rewards (social) and enhancing positive mood/fun (enhancement motive) were the most common motives, although conformity and coping still played a smaller role. The familiarity with individuals in their new drinking circles could be an explanation for social motives being prevalent again.

> ***Alan**: To socialise with different people, we do, obviously it's quite…there's…there's a few more of us now than what there were when I kind of…just after I finished university so it's kind of a social side of it again that's come back, maybe having a little bit of a laugh*

> ***Ellie**: It seems to be quite…quite a big part now more than what it was previously just because the time that I have to socialise [yeah] like on an evening or when we're kind of gathering with a group of friends [yeah] so* there's usually a drink there involved.

One interesting addition to this social drinking was that in participants who weren't consuming alcohol on a weekly basis, large social gatherings were the primary context for their drinking e.g. weddings, birthdays etc. Although these gatherings may not happen that often there can be times where lots of these events are taking place within a short time period. Again, drinking motives were primarily social although enhancement motives also came into play. This is evidenced in the following quotes.

***Jade**: once a few months ago out with work just that either people are retiring or people's birthdays and stuff.*

***Ellie**: we have like at the end of the residential we had a little celebratory drink it could be quite a big drink but that will be once every so often*

Similar to phase two there were far fewer references to peer pressure (conformity) as a motive to drink at phase three. Additionally, the participants seemed much further removed from university friendship circles and were now only socialising with a few core friends from this period. There was no directly perceived pressures to drink. Any pressure that participants felt was from trying to adhere to general social conventions and norms (indirect pressure). Previous research on the role of peer pressure in heavy drinking has demonstrated that it is often indirectly linked to alcohol use and in fact, enhancement motivations and coping motivations are the real factors at play (Studer et al., 2014). Despite this, the notion of conformity did still seem to be quite prevalent in certain scenarios for these graduates, such as drinking publicly. Below is a quote from participant 2 discussing how he felt the need to drink whenever he went to the pub.

***Alan**: I feel the need that you've almost got to have a drink in your hand [yeah] to look normal [yeah] very rarely I ever see anybody who's kind of down or in a pub without a drink in their hand.*

Interestingly participant 7 seemed to feel a lot of indirect pressure to get involved with social drinking as this was how many of her work colleagues and friends tended to socialise. While not as much of a constant pressure as when she was at university, this mirrors her feelings from her time as a student, highlighted during the

phase 1 data, where she also expressed a perceived pressure to drink.

> ***Dina****: I really really do just do it because friends are doing it so if that's what they're doing and if they're oh come out then I will but I won't necessarily be the one to instigate going on a night out. It will literally be just a…that's what they're doing and I want to see them…*

Two of the participants who were not involved in sport during phase two had returned to competition by phase three of the data collection, meaning that 5 of the 8 participants were involved in regular sport participation at this phase. Of the remaining 3 participants, one was actively involved in coaching, while the other two currently had no involvement in sport. For all of the participants still involved in sport, whether it was playing or coaching, sport participation still had an influence on their drinking behaviour, and was a main context for their drinking. When looking at the AUDIT scores for the 2 participants who returned to sport in phase three there was a slight increase when compared with their phase two scores (Participant 5 = 4-6, Participant 8 = 13-15). Participant 4, who was still playing semi-professional rugby characterised the importance of alcohol in sport, and in particular rugby. This seems to take the form of conformity to the group, specifically that he feels that to be a part of rugby you are expected to enjoy a drink.

> ***Billy****: I think from grassroots level to professional level. I think, specifically with rugby, there is a culture of rugby players being known for enjoying a beer. I think that's the majority of sports but more specifically rugby players.*

Participant 8 had returned to playing rugby after a break from the sport and she echoed the importance of alcohol in the culture of the sport, with the norm being that alcohol consumption would form part of the experience.

> ***Katy****: usually, on a Sunday, we'd maybe have one or two drinks and then everyone will just go home whenever they wanted. Some people might then go to the pub. For example, last Sunday, it just turned into a bit of a session because both First Team and Second Team were at home, so we were all just kind of socialising with each other and went to the pub.*

The final prevalent motive amongst participants at phase three was coping, in particular, stress relief. This is another factor that was present across all three time phases of the study but had manifested in different ways. Phase three was very similar to phase two in that participants were motivated to drink in order to forget the pressures of the working week. Participant 8, who previously had been in a temporary job, was now in employment that she saw as a potential career. Below is a brief quote from her interview demonstrating how the pressures of her job were a motivation for her to go out and drink.

> ***Katy****: Probably more now, if it's been a long week or a tough week and it's a Friday and I guess I'm in London as well. I just want to go out for a drink really*

4.3.3 Barriers to drinking

4.3.3.1 Phase One

Although the sample for this study comprised of typically heavy drinking students, several barriers to engaging in alcohol consumption were identified by the participants. These barriers seemed to override or at least lessen the impact of the drinking motives as students made conscious decisions to reduce their alcohol consumption in response to the barriers. The most commonly occurring of these barriers were responsibilities associated with their programmes of study. Students were conscious that they should not be consuming alcohol prior to handing in assignments or in the build up to exams. This was a universal barrier amongst all of the participants involved in phase one of the study. Reducing alcohol consumption because it may interfere with studies has long been seen as a key barrier to alcohol consumption in students (Greenfield, Guydish, & Temple, 1989). Below are examples of several instances where students consciously restricted their alcohol intake due to these responsibilities.

> ***Lucy****: Yeah, with dissertation and that not many people wanted to go out very much, especially when it came to the deadlines like maybe wouldn't even go out for like a couple of weeks.*

> ***Sean****: Nights' out, particularly in the final year, wouldn't have happened as often as previous years. Obviously, you've got more on, in terms of dissertation and I had a job as well and so I was trying to balance all that. I found that most of my classes were early, so they started at maybe nine or ten. Going out 'till two or three in the morning just wasn't practical, with classes the next day.*

***Dina**: Like when my grades actually did count and were more important I knew I couldn't take the risk of going out before an exam or going out when I had assessments to do because I knew that it would have that effect on them.*

An increase in responsibilities associated with transitioning to adulthood has been previously linked with a reduction in alcohol use (O'Malley, 2004). While it is typically associated with the increase in responsibilities that come with careers, family life and becoming a homeowner, it is possible that by the time students reach the final year of university, they see their assessments as the first step on this journey to adulthood. As can be seen from participants 5 and 7, when they were completing work that counted towards their degree classifications their motives to drink (e.g. social and enhancement) were outweighed by their desire to complete their academic work effectively. At least temporarily, social and enhancement motives were displaced by for example, motives around academic success.

The costs of alcohol also acted as a barrier to alcohol consumption for these participants. This was a factor across the degree programme and not just something that became more prevalent in the final year as can be seen from participant 2's quote below.

***Alan**: I'd probably try and limit the amount of times I went out in first year and saved up a bit more money so I could just have a little bit more now it's in the third year cause a lot of it were down to money as well in the third year.*

Participant 4 also commented on how he didn't feel he could justify the expense of regular heavy drinking and this was something that caused him to reduce if not abstain from alcohol consumption at times.

***Billy**: You'd have a few beers and you know enjoy myself but I wouldn't necessarily be able to justify spending that extra £50, £60 on the Saturday night when I could've put it in to something else.*

There have been several initiatives at government level to increase the cost of alcohol to try and reduce hazardous consumption in society as a whole (Department of Health & Social Care, 2015). The data from this study would seem to lend some support to the notion that the cost of alcohol consumption can be a barrier to alcohol use in students. However, several participants also commented that while they were reluctant to spend too much money on alcohol, they had strategies to work around it. For example, they often consumed cheaper though less preferred drinks, and engaged in pre-drinking prior to leaving the house.

***Rochelle**: On offer at the bar usually and try and get most for your money because you don't go out with that much because you can get so much for so little.*

It is interesting that these students had identified a clear strategy to overcome the cost barrier but had not taken any action to negotiate and manage the barrier imposed by academic responsibilities. It could be that whilst a work around strategy could be found quite easily in relation to the cost of alcohol, i.e. buy cheaper drinks, there is no obvious strategy for dealing with the constraints of academic demands. Alternatively, it is possible that students are willing to reduce their alcohol intake temporarily at key points in the academic cycle. This may be because they know that the situation is temporary and that there will be further opportunities for heavy drinking once the pressure point has passed. This would be an interesting area of future research.

While responsibilities and the cost of alcohol were the two barriers discussed the most by the participants, there were several other barriers of note that were mentioned. The first of these were the living arrangements of the students. Participant 1 lived at home during university and she found this especially helpful to her when resisting the peer pressure that was common amongst the students. i.e. she had a ready-made excuse for not conforming to group norms and expectations. What is interesting about her comments on peer pressure is that she saw it as a positive that she wasn't exposed to it as much as her peers.

***Jade**: No, I lived at home.*

***I**: You lived at home*

***Jade**: yeah*

***I:** So you sort of didn't have that group pushing you to go out*

***Jade**: yeah exactly, thankfully*

Participant 4 lived with his non-student partner during his final year. He stated that how his drinking would negatively impact on her, was a key factor in his decision making about drinking. This is similar to the "maturing out" effect discussed earlier. For this participant, the social and enhancement motives were overridden by his motive to maintain a successful relationship.

***Billy**: I think drinking can be a very selfish thing. Well I think it is a very selfish thing. You do it because you want to do it. Whereas with a partner, whether you live with them or not I think sometimes, you've got to think about them and how they'd react. Especially living with mine, you know would coming in at 4am on*

a Wednesday night, be acceptable when she's at work half eight the next morning?

The final scenario mentioned during the interviews was by participant 9. She discussed how living with more mature postgraduate students during the early stages of her degree affected her drinking.

***Rochelle**: Yeah, because I lived with post-grads as well. I got put in halls with post-grads who weren't going out.*

The participant may still be exhibiting a conformity motive but in this instance, she was seeking to avoid rejection by the people she was living with. As this group were not heavy drinkers, social acceptance and conformity meant adhering to sensible drinking behaviour, rather than excessive drinking.

Using role models or mentors is a well-established practice in behaviour change interventions (Kirkbride, 2006). It is possible that spending more time with older more mature students had a positive impact on participant 9's drinking behaviours during these stages of her degree.

A perceived sense of increased maturity also acted as a barrier for some of the students who were interviewed. Participant 4, in addition to living with his partner, was two to three years older than most of his peers. He discusses below how he feels this added maturity meant his drinking behaviours were less harmful than those of his teammates.

***Billy**: I think maybe my age was a little bit different. I know I'm not old but I was maybe 2 or 3 years older than the majority of the team. So when I was in final year I was 23, the rest would have been 20-21. I just think my life in general that year was completely different to students as I lived with my partner, my girlfriend at the time. So that also had a major effect. I'd go home, I'd rather probably have my dinner and watch the telly and chill out with my girlfriend rather than going home to 5 lads, 3 maybe drinking.*

Here, this participant is expressing a desire to conform to behaviour that is perceived to be socially acceptable for his individual situation, a situation that is slightly different to that of the other students.

Participant 5 also discussed how taking a gap year helped him act in a more mature manner while at university.

***Sean**: I mean I took a year out after school and through maybe Upper Six and that year out, I went out and did all that with my mates back home. So coming to Uni, it's good to have your own independence but I see a lot of people coming away who have just finished school and they've maybe just turned 18. For them, it's just; 'Let's go and party'; whereas, I'd kind of got that out of my system a little bit.*

***Sean**: Some people will be peer pressured into the drinking; whereas, I can guarantee you, I'm not like that. Whenever I've had enough, I know that's me done.*

This participant states that he is more capable of regulating his alcohol consumption than other students. He also feels that his drinking behaviour whilst at

university was not as excessive as most of his peers. What is interesting is that despite his perceived mature and sensible relationship with alcohol, according to the AUDIT this student was classified as a hazardous drinker. This is a reflection of the norms associated with drinking amongst UK student athletes, where hazardous levels of consumption are viewed as mature, sensible drinking.

For some participants, early negative experiences of drinking at university also seemed to be a factor in shaping drinking motives and ultimately decisions about drinking. This would fit with the drinking decision making model presented by Kuntsche et al. (2005). In Kuntsche et al's. (2005) model, previous experience is considered an important antecedent within the decision making process. Previous experience of the negative consequences of alcohol consumption has been shown to be a key factor in limiting drinking in previous research carried out on the wider student population (Epler et al, 2009). Participant 6 discussed how a night out during her first year shaped her perceptions around drinking for the remainder of her degree. For this participant, her desire to avoid repeating that negative hangover experience became stronger than the conformity, social and enhancement motives that could have tempted her into heavy drinking.

> ***Ellie****: I did not want to be in that situation ever again (laughs), it was awful, it was like using every bit of energy just to try and concentrate for that hour, even though it was the only thing I had for the rest of the day that one hour was like the worst time ever. So I was like "right I'm not doing that again".*

4.3.3.2 Phase 2

Following graduation from university, responsibilities were an even more significant barrier. During this period, all of the participants were involved in work, or in programmes of study that had compulsory work placements(e.g. PGCE's). As a result, they all commented on how the responsibilities of their jobs, even if the jobs were only stop-gaps, meant they would rarely consider drinking the day before work. According to the Kuntsche et al.'s (2005) drinking decision model, here, social and enhancement motives for drinking are being tempered by both historical and current factors.

> ***Lucy****: Yeah 100% you know at uni you'd be up 'til like 1, 2 in the morning so you'd feel like you could go out 'cos there was nothing else to do, when I got in to a full-time job I was in bed for like 11, I'd be like 10 or 11 o'clock [yeah] so you didn't really like want to go out.*
>
> ***Sean****: so normally any time I would have had a…had a drink the night before work would have been the day…I'd be off the next day and also as well because the job involves driving so again sort of two birds with one stone, I would never want to go in and run that risk of still being slightly over the limit.*
>
> ***Jade****: Yeah definitely I mean I wouldn't dare do that now, now I've got a job and things.*

This is consistent with the concept of "maturing out" and provides further support for this notion. The literature on maturing out has established that there are two key life transitions that have a significant effect on reducing alcohol consumption, getting married and having children (Dawson et al., 2006; O'Malley, 2004). However,

the recent extension of the transition to adulthood, delaying these transitional effects, may mean that other key transitions such as starting a career or buying a house are of increasing importance (Settersten Jr & Ray, 2010).

At this stage, participants experienced less peer pressure to drink than they had done whilst at university. During phase one this perceived peer pressure influenced the participants to engage in alcohol consumption as they felt they would be missing out if they did not or that they might be excluded from a particular social circle. At this phase, because members of the participants' social circles were not going out as often and were not drinking as much, conformity to heavy drinking was less evident. If anything, participants were actually conforming to more sensible drinking behaviour because this was the more prevalent behaviour amongst their social group, at least during the working week.

> ***Alan****: I think there were less people going out so that made me kind of stay in a little bit more. So you didn't have that kind of peer pressure around you that they're all [yeah] going out and you felt like you were missing out on something, it just felt like I could concentrate then on the kind of work that I was doing.*

Similarly, participant 1 discussed how the lack of pressure from her peers on the PGCE course she was on was a large factor in why she reduced her alcohol consumption during this initial period following graduation from university. In fact, it was almost that there was an element of peer-pressure to not consume alcohol. There has been some suggestion in the literature that the influence of social norms can act as a barrier to problem drinking. Research in the US found that adolescents whose parents held strong beliefs on abstaining from alcohol were also likely to abstain (Wood, Read, Mitchell, & Brand, 2004). However, this influence was reduced once

these individuals left home for college (Wood, et al., 2004). What is interesting about the above comment from participant 1 is that it suggests that the drinking cultures at work, university and within sport differ. Individuals may still have the motive to conform to the drinking norms of the particular culture that they are in but those drinking norms and behaviours are likely to differ.

> ***Jade****: obviously with a PGCE it was quite…far intense so there was none of that, you couldn't…you couldn't really go and be like oh it will be fine, I'll be hung over the next day, everybody will be hung over 'cos there just wasn't that.*

Participant 8 discussed how the maturity of now having a job and the responsibility of earning your own money was a limiting factor on her alcohol consumption.

> ***Katy****: When I moved back, you're earning your own money now; you need to be a bit more responsible.*

She further linked this to the cost of alcohol, which again was something that was in common with students in their final year. Given that many of the students were now earning their own money it is interesting that cost was still a factor to participants at this stage. The fact that this was money earned rather a regular chunk of money from a student loan at the beginning of each university term seemed to be the main issue i.e. they were more cognisant of the value of money now that they had to earn it themselves.

***Katy**: obviously I was working and didn't really have that much money. The pay where I was working wasn't particularly great and I guess when I was at Uni, I had student loans…. I'd probably still have one or two drinks but I'd be quite conscious of the fact of my money and I'd need to save it and just be careful what I spent it on. I'd probably go out and have one or two and then just call it a night*

4.3.3.3 Phase Three

Moving into phase three of the data collection, the responsibilities of work were again the key barrier to alcohol consumption. The comments from participant 1 below evidence the desire to avoid drinking close to days when she will be working.

***Jade**: yeah I guess so, I guess that I don't really want to be drinking mid-week 'cos I don't wanna feel rubbish kind of the next day for work and also when you're working with six and seven year olds that's the last thing you want.*

Interestingly while participant 2 also comments on the desire to avoid drinking on days before he has work he also offers some insight into how he shapes his drinking behaviour to counteract this responsibility. This type of behaviour could be compared to that of a student who seeks out cheap drinks and other promotions to continue drinking around limited budgets. Here the individual is making a strategic decision about his drinking, which is influenced by his motives of enhancement and social benefit but also his desire to perform effectively at work, essentially a trade off between motives to drink and a rational assessment of the potential consequences.

***Alan**: when we do go out on a Saturday you've got to be very tactical about it if you've got work on Monday [right] obviously a busy…busy time at work, obviously a bit more pressure and a bit more responsibilities now at work with being obviously the lead teacher I tend to try and get out on a Friday night and recover on Saturday and then I can be back working again on Sunday ready for the week ahead.*

As the participants become more mature as they progress further from their life as an undergraduate student, they become more aware of the role of responsibility and maturity in regulating drinking behaviour (Colby, Colby, & Raymond, 2009). Participant 6 discussed how her increased responsibilities and newfound sense of maturity meant that she had greatly reduced her alcohol consumption by phase three.

***Ellie**: I think I'm a bit more settled and like I say you obviously mature a lot more when you've got more responsibility and stuff [yeah] when you come out of uni.*

This is also supported by comments from participant's 3 and 4 who provide further insight into how social interactions have changed alongside this increased level of maturity. This further supports the notion of maturing out. Participant 3 discusses how the fact that she and her friends are no longer single and are now in relationships has impacted upon her drinking. Participant 4 discusses a general increase in perceived maturity.

***Lucy**: Just 'cos like my friends are all like settling down as well, we don't go out as much [yeah] we tend to like go out for a meal not like go out on a big night in…in Derby or Nottingham or anything like that.*

***Billy**: The year after Uni, I'd have said that every Saturday would have involved being out socialising with the rugby team; whereas now, it's more selective. It wouldn't be every Saturday. I think, as I've got a little bit older.*

One barrier that wasn't considered in earlier phases of data collection was sport participation. While both of these participants highlighted how sport could facilitate their drinking, by providing additional drinking opportunities, they also commented on how it acted as a barrier. Because of the high level that both were competing at they were reluctant to engage in any drinking that could impact negatively upon their sporting performance. Recent research has suggested that measures of physical performance are unaffected the day after heavy drinking however, sleep quality was greatly affected (Prentice, Stannard, & Barnes, 2014). Therefore, this feeling amongst participants could be related to an impact on their mental sharpness rather than their physical performance. The increased responsibilities of adult life would also likely contribute to this perceived barrier.

***Billy**: if you play rugby on a Saturday, you get a few more knocks, few more bumps and your body becomes a little bit more sore. If you go out and have a big night on alcohol, then your recovery rate slows down even more. I'm not quite the spring chicken that I used to be,*

***Katy**: because I play rugby now down here and I train twice a week and then we'll play on the Sunday, so I never really drink on the Saturday.*

These observations are interesting as originally it was thought that sport might act as a preventive measure when it came to alcohol consumption (Murphy, et al., 2005). However, more recent research has shown this is not the case (Partington et

al., 2013). What has been commonly observed in recent research is that sportspeople, even at the elite level; tend to engage in heavy episodic drinking rather than more stable drinking patterns (Prentice et al., 2014). These quotes lend support to that view in that alcohol consumption becomes centred around occasions where it is unlikely to have a detrimental impact on sport performance.

The final barrier that was of interest in the final phase of data collection was the cost of drinking. This time however, it was closely linked to maturity and the responsibility of saving money for anticipated expenses such as house deposits. Research on maturing out has established that key life events can have a significant effect on an individual's ability to transition away from heavy drinking to a pattern of low-risk asymptomatic drinking (Dawson et al., 2006). It is very likely that key life transitions, such as buying a house act in this fashion. This is demonstrated in the following quote from participant 1.

> ***Jade**: I don't know I just think I find now, now I'm older and one a waste of money [yeah],…. We were drinking quite a lot so it was like we were always spending money whereas now we can save up.*

4.3.4 Impacts of drinking decisions

4.3.4.1 Phase One Negative Impacts

The final theme that emerged from the data was related to the perceived impacts that alcohol consumption had on the participants' day-to-day lives. The most prevalent instance of this found in the data was related to the quality of sleep students achieved following heavy alcohol consumption. The majority of students reflected that following days of heavy consumption their sleep was negatively affected. In some

instances, students reported that the negative effects that followed this poor sleep could impact upon their lives for several days following the drinking episode.

> ***Jade****: so if you'd gone out on a Saturday night then you'd still be quite tired on a Monday. So I suppose it affected you in that way. So on Monday you'd be a lot tireder than you were on Friday.*

> ***Lucy****: think that err had a big effect on my sleeping patterns, because if you went out one night then you wouldn't get up till late the next morning and then you wouldn't be able to sleep till late the next night, so it would sort of be an ongoing thing.*

Excessive consumption of alcohol has been linked to poor sleep quality (Irwin, Valladares, Motivala, Thayer, & Ehlers, 2006). Alcohol has been shown to impact upon sleep quality by altering vagal tone prior to sleep (Irwin, et al., 2006). Vagal tone relates to the activity of the vagal nerve, which has been shown to affect changes in heart rate (Irwin, et al., 2006). By compromising vagal tone prior to the onset of sleep a reduction of delta sleep occurs, which leads to a perceived reduction in sleep quality. This is of interest as delta sleep, commonly referred to as deep sleep, is suggested to be essential in allowing the brain to recover from its daily activities and form new memories (Irwin, et al., 2006).

The knock on effects of this reduced sleep quality can be seen in some of the other impacts mentioned by students during phase one. Commonly students reported that they were likely to fail to meet basic expectations and commitments required of them in their student life as a consequence of their alcohol consumption. This is particularly interesting as the responsibilities associated with being a student were

identified as a barrier to alcohol consumption. Clearly, there is some level of mismatch between how students expect themselves to behave and what they actually do. Participant 9 described how taught sessions that followed a regular night out were poorly attended and as a result her mark was also negatively affected.

> ***Rochelle****: one of my modules, a portfolio one, was on Friday mornings and I made only a handful of them, to be honest and that really affected my grade in that. That was probably the worst grade I've ever gotten in Uni.*

These failed commitments can also be explained by the next impact mentioned by the students, a reduction in general motivation. Participants 1 and 2 highlighted a general level of demotivation for all tasks, not just those related to their studies. This is interesting as previous research in students has focused primarily on their academic engagement and motivation, (Porter & Pryor, 2007).

> ***Alan****: think alcohol slowed me down massively erm with doing stuff err I felt like I were often felt tired, ill, can't be bothered to do anything.*

> ***Jade****: biomechanics seminars you had quite a lot of involvement and you had to fill things in and especially on a Thursday morning after Wednesday night you really couldn't be bothered.*

Participant 4 described how the impact on sleep had a knock-on effect to both his motivation and failing do what was expected of him as a student.

> ***Billy****: I think it; puts off what you want to achieve. It can affect what you want to achieve and how you achieve it. For example, I think let's say it's a Wednesday and your hand in is a Friday. I've played rugby on the Wednesday. I would say*

95% of the time I would've gone out on that Wednesday which would have had the knock on effect as you say with the sleep and then I'd have felt awful the next day and then you kind of wake up on the next day and think I'll do an hour, and your hour never really materialises your waking up at 5am Friday morning. Which will obviously throw you anyway because you're not used to waking up at 5am to try and do 7 hours to try and get in for the 12 o'clock so.

The next impact of alcohol described by the students resonated with the findings from study one. Many of the students were aware of an impact on their everyday cognition following alcohol consumption. Findings from study one showed that in general as alcohol consumption increased, there was an increase in cognitive deficits to aspects of everyday memory such as prospective memory and executive function. Participant 8 describes in the following quote how following excessive alcohol consumption, she often failed to recall things she had to do until much later than normal.

***Katy**: my memory is not as... sometimes, I'll remember something ages after and then I think to myself, 'I'd normally remember that sooner'.*

Participant 3 talked about how excessive alcohol consumption the night before had a direct effect on her concentration levels in taught sessions.

***Lucy**: then if I did go to lectures, concentration I think that decreased, err and I maybe didn't take in as much information as I would have if I hadn't have gone out the night before.*

This observation is consistent with what is known about the impact of alcohol on prospective memory. As was mentioned in the earlier literature review and as was

demonstrated in study one there is a sharp decline in prospective memory with increased alcohol consumption (Heffernan et al., 2006). For students this can have the impact of failing to attend important lectures and seminars, and/or not retaining key information from readings and taught sessions. This can have a significant negative effect on their degree.

Another cognitive deficit mentioned by the participants was the lack of recall of memories from the previous night. This is something that has been found in previous literature (Irwin, et al., 2006) and can be explained by existing knowledge about the impact of alcohol on sleep (Irwin, et al., 2006). Participants in this study described how they were often unable to recall key details from the night before usually having to rely on friends to help them construct an accurate narrative of what had happened. This type of memory loss is often linked to the risky behaviours associated with heavy episodic drinking such as injury and unplanned sexual activity (Corte & Sommers, 2005; Morojele et al., 2006).

> ***Alan****: obviously the main one, which you can't remember the night, the night out. Erm when you wake up in the morning and you're trying to piece together. We often did a debrief in the front room.*

The final key impact highlighted by the students in phase one was the impact of alcohol consumption on their sporting performance. Given that all of the participants in the study were student-athletes this is of particular concern. Not only was their motivation to play sport reduced following episodes of heavy drinking but heavy drinking was also perceived to have an impact on their development as sportspeople, preventing them from achieving what they believed was possible. This is evidenced in the following excerpts from participants 2 and 3.

***Lucy**: if I went out then I'd feel like less motivated and I probably couldn't be bothered to play as much as if I didn't go out the night before.*

***Alan**: I felt the alcohol stopped me from actually progressing in sport because when I went out in the first year, I obviously were recovering from an injury erm but with me going out a lot more I couldn't be bothered to get up and go and train, I couldn't be bothered to get up and so that made me lazy and it disappointed me in a way because second and third year that's when I wanted to do, because I had more spare time I didn't want to go drinking all the time. I wanted to do my activities, whereas I found it a lot harder then to regain fitness.*

4.3.4.2 Phase 2 Negative Impacts

At phase two, participants still commented upon the impact of heavy alcohol consumption on their sleep quality. This is consistent with what has already been discussed regarding alcohol, vagal tone and sleep quality. Examples of the perceived reduction in sleep quality are detailed below.

***Lucy**: Yeah when we did go out on Saturday night it would sort of you know you'd feel rough all day Sunday and then it would mess your sleeping pattern up a bit*

***Ellie**: I'd feel tired or like feel like exhausted or whatever where now I'm like "ooh Jesus" like where's the time gone and why am I so tired for and [yeah] things like that so yeah I would say in that respect I'm more tired than usual.*

Despite an overall reduction in alcohol consumption compared to their student days, at this phase, participants' still noticed cognitive deficits as a result of their

alcohol consumption. Below participant 8 describes how this reduction in cognitive functioning impacted upon her day-to-day life.

> ***Katy****: especially at the end of the shift and throughout it, counting money. I probably found myself having to maybe count the till at that particular time or afterwards, so I've got to count all the cash up and put it in the safe. I'd probably have to do it several times and I'd probably get a different total every different time.*

In addition to these cognitive deficits, some participants began to notice that alcohol had a negative impact on their overall mood. Participant 2 described how his mood was negatively affected for several days after an episode of heavy drinking. This observation is interesting as many of the participants, including participant 2, reported drinking to improve mood (enhancement motive) and reduce stress (coping motive). It would seem that despite his belief that drinking could have an immediate positive impact on his mood, the delayed impact (next day or through the week) was negative. This could be related to the fact that he is now working and where he may normally have missed university to recover from a drinking session he now has to go to work, losing the chance to recover physically and mentally. Within the current literature, alcohol use has been linked with several mood states ranging from positive mood to depressive states (Sadava & Pak, 1993). Typically, negative mood is associated with alcoholism and problem drinking (Sadava & Pak, 1993).

> ***Alan****: I think it impacted on the mood as well that I was in going into work so sometimes I were waking up very tired on the Monday [yeah] it just gives you a bad start to the week going through to the Friday [yeah] and obviously it's not*

the greatest profession (teacher) if you're not in the best of moods to try and motivate and encourage individuals if you're not motivated yourself.

The final impact of note at phase two was on motivation. Similarly, to phase one participants reported that following heavy alcohol consumption they were often left feeling as if they "couldn't be bothered" and that this feeling of lacking motivation was common both in relation to sport in the case of Participant 5 or postgraduate course attendance in the case of Participant 8.

***Sean**: I think you know in terms of possibly training so whether it be football wise or going to the…some days you were…well I was having a session more as a recovery session as opposed to progression you know so the session would have been much more productive if I hadn't been drinking the night before*

***Katy**: I think probably towards the end of it, I'd just be like, 'Oh... ' This sounds bad, I know but I'd just be like, 'Sod this!' kind of thing.*

4.3.4.3 Phase 3 Negative Impacts

At phase three, the participants still commented upon the effect of alcohol consumption on their sleep quality. Alcohol consumption at this stage had become less heavy and less frequent for many of the participants, however, when engaging in heavy episodic drinking the sleep issues were still present.

***Jade**: Quality of sleep and the length of sleep 'cos obviously if you've been out you're gonna go to bed later and you kind of still wake up at the same time 'cos*

your body clock's set in so you wake up and you end up having a couple of hours less sleep and obviously you've been drinking so you don't feel great.

***Dina**: the most recent couple of times I've had a night out I've found that I'll struggle to sleep [yeah] I struggle to sleep when I get home and then they'll wake me up quite early.*

Participant 8 was a heavier drinker than those above and she also discussed the impact of alcohol use on her sleep quality. Her sleep issues were perceived to have a wider impact on the rest of her week also.

***Katy**: I still don't really sleep as well on the night after I've been out and I still find myself waking up early. I think if I'd gone out and I didn't drink the night before, I'd probably able to lay in a bit longer…. For example, on that last Sunday when I went out after rugby, it really had an effect on me and I felt so tired for the rest of the week.*

Similar to phase two of data collection participants also noticed deficits in cognitive function following drinking sessions. Participant 8, who as stated above was one of the heavier drinkers at this phase, was convinced that both her current and historical alcohol consumption had a direct effect on her memory. This observation ties in with what is known about the impact of current alcohol use on memory (Ziegler et al., 2005). However, the assertion that her historical use of alcohol has contributed to current deficits in memory is of note, especially when considering the observations in study one that memory scores improve as alcohol consumption reduces.

***Katy**: Truthfully, I'd say my memory's probably got worse. I've noticed the past few months that my memory isn't as good as what it used to be, I think it's*

probably due to drinking and having a few bangs on the head at rugby but I think a lot of it is probably drinking quite a lot at university which I think has kind of affected my memory now, I'd say

Despite generally drinking less at phase three, participants still felt that when they did drink, it did have a negative impact on their motivation and overall mood. These views are very similar to those expressed at stage two.

***Billy**: I think it's bad for your psychological wellbeing. By all means, I don't mean anything about depression but I think it can make your mood quite low.*

***Alan**: then on occasions you kind of just don't do it just 'cos you can't be bothered to [yeah] as it requires, even though it only requires minimal effort sometimes, whether it's putting the washing in it just seems like a difficult challenge to do that.*

***Sean**: if I had had a drink on the Saturday, training on a Sunday might be a bit more challenging or I might have to either go later or [yeah] I'd go to sort myself out so I would say that's the main impact it would have on.*

One impact that was specifically emphasised during the final phase of data collection was that of hangovers. While other factors that are symptomatic of hangovers were mentioned at earlier phases, hangover itself emerged as major impact at phase three. As has been discussed in the earlier literature review, hangovers are one of the key consequences of alcohol consumption and can lead to many of the negative perceptions surrounding drinking. As such, it is interesting that it wasn't mentioned as a key impact for participants until they were quite far removed from university. The literature suggests that age may be one of several factors that can

impact upon hangover severity, however there is relatively little research to support this notion (Tolstrup, Stephens, & Grønbæk, 2014; Verster, 2008). It is possible that a combination of factors such as age, drink type and physical fitness could be influencing severity of hangovers, and this coupled with the increased responsibilities of adulthood has affected their perceptions (Verster, 2008).

***Lucy**: definitely hangovers seem slightly worse than they were at university.*

4.3.4.4 Positive Impacts

Despite the fact that all participants were categorised as at the very least, in the hazardous category on the AUDIT at all phases of the study, there were relatively few positive impacts of alcohol consumption identified by participants. The main benefit identified was the social benefit that alcohol consumption could have on their lives. This was particularly apparent when students discussed being in a new environment such as when they started at university. By engaging in drinking, they were better able to fit into university life and to meet new and likeminded people (Burns et al., 2015). It was used in the same way when participants entered new social circles e.g. a new job or new postgraduate course at phase two. Again, alcohol was used as a way of gaining acceptance in social groups. At this stage, it was less about fitting in with the group in terms of social norms around drinking (conformity), and more about using alcohol to provide the confidence (enhancement motive) needed to interact with new people.

The second positive impact was mood enhancement and the reduction of stress. On several occasions it was mentioned that going out and having a drink facilitated relaxation and alleviated stress. Whilst at University this was in the form of celebrating reaching certain milestones or completing particular pieces of work. Once

in the work environment (phases 2 and 3), alcohol was generally used to ‘blow off steam’ at the end of the working week.

Finally, some students discussed the positive impact that alcohol consumption had on their sleep. This seems at odds with the majority of the sample and with what is known about the effect of alcohol on vagal tone and sleep quality (Irwin, et al., 2006). It is possible that the participants who reported this effect were not drinking as heavily as some of their peers at this point in the study and were possibly taking advantage of some of the stress relieving benefits of alcohol use to quiet mental processes before entering sleep (Irwin, et al., 2006).

4.3.5. Attitudes towards drinking decisions

In general, participants demonstrated little regret in relation to their drinking habits while at university. The following quotes show that despite not achieving as high a degree classification as could have been possible, participants did not regret their behaviour or see any need to change it. This type of attitude is not uncommon, with previous studies also reporting a large proportion of heavy drinking students uninterested in changing their drinking behaviour (Longstaff et al., 2014). This was due to the value placed on the social benefits that accompany heavy alcohol consumption whilst at University. Indeed, recent research has highlighted that students perceive alcohol use to be acceptable and socially normative in student populations (Brooks-Russell, Simons-Morton, Haynie, Farhat, & Wang, 2014). Indeed, there has been some suggestion that the social benefits of consuming alcohol, particularly with regard to its perception on social media, is now a key factor in student drinking behaviour (McCreanor et al., 2013).

***Sean**: I don't think, if I went back to university now, I really would change. I think I'd probably still go out and drink but it wouldn't be the be all and end all.*

***Katy**: it's quite annoying and I do think, 'Maybe if I didn't go out, I could have got a couple of extra marks on essays that I might have done on all-nighters'. Part of me does regret that a little bit but then part of me thinks, 'But you've had a good time and you've had fun. It's not the end of the world'.*

Reflecting back on their university experience 18 months after graduation (Phase 2), the participants in this study still felt content with their drinking behaviours while at university. It was mentioned that university is a time to experiment with alcohol consumption and to learn about your own limits. Additionally, there was a general sentiment that alcohol consumption was crucial in the early stages of university in order to make the most out of the university experience. Previous literature has suggested that undergraduate students view alcohol consumption as a vital part of the socialisation process at university (Burns, et al., 2015). The perceptions of the participants in this study seem to support this finding however, there was some suggestion that alcohol consumption needed to be managed more carefully in later stages of the degree.

***Billy**: In terms of alcohol, I would advise them to maybe think more about towards the end of their academic studies in their final year and calm down, settle down and take it seriously; the same in the second year but not to the same extent as third.*

***Alan**: My advice would be don't kind of cut it out completely, I think it's…I think it's an important…important aspect of going through the university process and*

actually coming to terms with realising what effect it does have on you and I feel you kind of learn through your mistakes

Interestingly the participants who described themselves as people who were not heavy drinkers while they were students showed some level of regret that they did not drink more when they were at university. They reflected that they could have made more of the opportunity that university presents to engage in alcohol consumption without the burden of responsibility. It should be noted that these two participants, although having the lowest scores for male and female participants respectively were still categorised on the AUDIT as hazardous drinkers whilst at university. There is historical evidence in the literature to suggest that a large proportion of students classified as hazardous drinkers do not actually perceive themselves as this (Wechsler et al., 1994). It is likely that students who fall into this category spend time with people who are even heavier drinkers. As a result, they may experience some level of regret that they did not act in a similar manner when they had the opportunity.

***Ellie**: In all honesty I think I'd probably take advantage of the situ…like uni more and stuff, like the kind of…they let you kind of go out and stuff a little bit more 'cos you realise now after kind of graduating that you've probably had a little bit more time than what you'd let yourself…like give yourself credit for [ok] so probably would like take a bit more time to either go with like different people and stuff, not to say…not to say that I wanted to be a raving alcoholic and go out like loads [yeah] but I think I missed out on an opportunity beforehand.*

***Jade**: rarely got really drunk [yeah] but a lot of people on my course got a lot more drunk than me, if anything I'd probably socialise a little bit more but I'm pretty pleased with how [yeah] I kind of how I did it.*

Despite the fact that all participants were identified as being, at the very least, in the hazardous category on the AUDIT at all phases, none of them expressed any concerns about their drinking behaviour at any of the phases. This is consistent with what is known about attitudes and intentions to change behaviour from the perspective of the stages of change model (Prochaska, et al., 1992). People are likely to consider a change in behaviour once they recognise there might be an issue with it (Prochaska, et al., 1992). Until this level of cognitive dissonance is achieved then it is unlikely that any intention to alter behaviour will be observed (Longstaff et al. 2014). A recent review has demonstrated that there is still a considerable way to go to understand what mechanisms are effective in eliciting behaviour change in students (Reid & Carey, 2015).

4.4 Overall Discussion

When looking at the journey of the students across the course of the longitudinal study and what their perceptions on alcohol use were at each phase of data collection there are some key themes that are consistent throughout. The first is the importance of alcohol consumption in social interactions. At each phase of data collection this was the key motive for alcohol consumption amongst all participants. In particular, participants discussed using these drinking focused interactions to establish themselves in social circles, both at university and after they had graduated. This finding provides some valuable insight into the importance of social drinking at university and beyond.

Social drinking in the final year at university involved drinking with existing friends as part of an established social group. At this stage, students were drinking heavily due

to the desire to enhance mood, cope with stress, to gain social benefits and to avoid social rejection by conforming to cultural drinking norms.

Following the initial transition out of university and into a new work or study environment, with new people, drinking behaviours changed slightly. Although still drinking relatively heavily, there was some evidence of maturing out in relation to drinking (Vik et al., 2003). At this point, participants were still drinking to enhance mood but also now to increase levels of confidence to aid with new social interactions (enhancement motive). They also drank to reduce stress around new interactions (coping motive) and to gain social acceptance (social motive). The need to conform was less explicit but still present at this stage. For some, conformity meant conforming to the lower levels of drinking that were present in their new drinking culture (socialising with colleagues).

By the final phase, participants were more comfortable and established in their work drinking circles. They were also involved in more diverse drinking circles. Participants were still motivated to enhance mood and reduce stress but these activities were done strategically in relation to perceived barriers, and most participants were drinking less than they had at the previous stage.

Alcohol consumption was an important socialisation factor for individuals engaged in sport at all three phases. Post-match and post-training drinking offered additional drinking opportunities that were not available to those not involved in sport. The continued association between alcohol consumption and sport, post university, is an important finding from this study.

The main difference in motives to drink across the different phases was the decline in peer pressure, both indirect and direct. When talking with participants at the end of their final year of university, there was a unanimous feeling that consuming alcohol typical to that of their peers was expected of them and that in instances when perhaps they didn't want to drink they would do so in order to 'fit in' or to 'not miss out'. The effects of peer pressure on engagement in alcohol and substance use has been widely researched in adolescent populations (Teunissen et al., 2016) and to a lesser extent in university-aged samples (Borsari & Carey, 2001). Students, in particular males, are likely to adopt drinking behaviours they deem to be normal amongst their peers (Studer, et al., 2014). It is also commonly found that women have a greater discrepancy between their alcohol consumption and what they perceived others to drink (Lewis & Neighbors, 2004), typically because they tend to use male drinkers as a frame of reference. The findings from this study seem to suggest that both the male and female participants are aware of pressure to conform to the drinking norms of their peers (Longstaff et al., 2014) and are using this knowledge to inform their drinking behaviour. Interestingly many of the female participants commented that they felt they were not big drinkers, yet according to the AUDIT they were in the hazardous or harmful categories. This is consistent with the findings of other studies examining the understanding of sensible drinking limits (Cooke, French, & Sniehotta, 2010; Lewis & Neighbors, 2004).

Once they had left the university environment, however, the perceived pressure on the participants to drink when with friends and peers was significantly reduced. The only real instances of direct peer pressure (conformity) being cited as a motive to drink were in individuals who were still socialising with students or those still involved in sport. The continued link between sport and alcohol consumption is of note as all

participants who were still involved in sport by phase three commented on how it was still a facilitative driver for alcohol consumption.

The barriers to drinking and how they changed across the study also provided some interesting results. Fulfilling important responsibilities was important as a barrier to participants across all stages of the study but the responsibilities of being a student did not seem to include day-to-day attendance, rather they were dictated by assignments and exams. This differs from observations of life after university where the day-to-day responsibilities of work were perhaps the most important barrier to alcohol consumption, with very little drinking mid-week reported amongst participants. Perceived maturity was one barrier that was of interest at all stages of the study. This often seemed to be linked with key life transitions such as living with a partner, working in a job, and saving money. This is consistent with the concept of “maturing-out” which has been described in several previous studies (Dawson et al., 2006; O’Malley, 2004). What is interesting in the present study is that this is achieved at different stages for each individual and those who do not transition into these roles as soon as their peers still exhibit high alcohol consumption. Alcohol seemed to have a similar profile of impacts for participants across the three phases of data collection. At all stages sleep quality, motivation and cognitive functioning were negatively impacted by alcohol use. The impact of alcohol use on cognition is of particular note as findings from study one showed that several aspects of cognition such as prospective memory and executive function were negatively impacted by alcohol use. The fact that the participants were aware of cognitive deficits and yet continued with the pattern of drinking suggests that they were either unaware of the potential association or were not concerned by it. This implies that students viewed the negative impacts of alcohol consumption (reduced

sleep quality, lack of motivation, impaired cognitive functioning) as being outweighed by the perceived benefits, which were primarily social.

Finally, it is of some concern that although there was clear evidence of 'maturing out' (Vik et al., 2003) in relation to drinking behaviour, participants continued to drink alcohol at hazardous levels even two years following graduation from university. Interestingly, these participants viewed this 'hazardous' drinking as mature and sensible drinking behaviour. This is relative to the heavy drinking behaviour that they undertook whilst at university. Even two years on, individuals showed no regret in relation to their heavy drinking behaviour whilst at university, and in fact those who had been lighter drinkers even expressed some regret that they had not made more of the opportunity to drink heavily. 'Maturing out' does take place, but because individuals are drinking at such high levels whilst at university, the maturing out process does not take them down to low-risk drinking behaviour. This suggests that the cultural norms established in university drinking circles will influence students' perceptions of what is heavy and what is sensible drinking, both during their time at university and after they graduate. These findings demonstrate the importance of developing effective interventions designed to reduce university student drinking, in order to influence drinking at later stages of life. Further research into both the social benefits of drinking whilst at university, and also the potential barriers to drinking, is warranted.

5 Longitudinal investigation of everyday memory

5.1 Introduction

Alongside the longitudinal survey of alcohol use, participants were asked to provide details on their everyday memory with a view to explore the impact of alcohol consumption on everyday memory and executive function in students and recent graduates. The current chapter details the process of collecting and investigating this data across three separate phases, spanning nearly 3 years, to develop a longitudinal picture of everyday memory and its relationship with alcohol and sport.

As mentioned in the introductory chapter, the current literature provides evidence that there is a relationship between excessive drinking and everyday prospective memory (PM) (Heffernan et al., 2006), increased failures in everyday memory (EM) (Ling et al., 2003) and Central Executive (CE) functioning (Heffernan et al., 2004). Excessive drinking by students could be causing damage to their still-developing brains and this may have serious adverse effects later in life. As such, additional research is needed to understand how memory deficits change following graduation from university.

The aim of this particular chapter is to determine if there is any noticeable impact of alcohol use on everyday cognition amongst these students while at university and similarly to see how this changes, if at all, in the two-year time period following graduation.

5.2 Method

Please see chapter 2.1 for further details.

5.3 Results

5.3.1.1 Phase 1 Memory Scores

Scores were obtained for 246 participants on the PMQ, and for 233 participants on both the EMQ and the Webexec questionnaires. The mean score for the PMQ was 48.24 (SD = 21.24, range 0-143), the mean score for the EMQ was 68.28 (SD = 32.03, range 28-238) and for the Webexec the mean score was 11.31 (SD = 4.16, range 6-24).

The PMQ can be further broken down into three subscales called the long-term, internally cued and strategies for remembering subscales. Mean scores on these subscales were as follows; PMLT = 25.45 (SD = 12.50, range 0-94), PMIC = 22.75 (SD = 11.98, range 0-67), PMSR = 44.30 (SD = 24.84, range 0-126).

Sport Participation:

Students who participated in sport had a mean score on the PMIC subscale of 18.71 (SD = 9.00, range 0-42), students who were non-playing sports members had a mean score on the PMIC subscale of 22.32 (SD = 12.62, range 0-65) and students who did not participate in sport in any form had a mean score on the PMIC subscale of 23.88 (SD = 12.42, range 0-67). Employing Bonferroni post-hoc testing, the difference between students actively participating in sport and those with no involvement was significant ($p < 0.05$). There were no significant differences between playing members and non-playing members ($p = 0.79$), and between non-playing members and those with no involvement ($p = 1.00$). When looking at the differences between team and individual sport participants no significant differences were found.

Gender:

Significant differences were found, following independent t-tests, between several of the memory measures between females and males. Females scored significantly higher on the EMQ than males (t = 2.53, df = 231, p = 0.01), 71.90 (SD = 35.06, range 28-238) compared with 60.68 (SD = 22.83, range 28-130). They also scored significantly higher than males on the PMQ (t = 2.03, df = 244, p = 0.04), scoring 50.17 (SD = 21.71, range 0-143) compared to 44.38 (SD = 19.82, range 2-98).

Within the PMQ females reported significantly more errors on the PMIC subscale (t = 3.74, df = 244, p < 0.01) and made greater use of strategies for remembering (t = 3.26, df = 231, p < 0.01).

5.3.1.2 *Interactions*

Significant positive correlations were found between total AUDIT score and the PMQ (r = 0.286, N = 246, p < 0.01), EMQ (r = 0.271, N = 233, p < 0. 01), and the Webexec (r = 0.235, N = 233, p < 0. 01). When only comparing the consumption items on the AUDIT this association still remained significant at the 5% level for the PMQ (r = 0.137, N = 246, p < 0.01), EMQ (r = 0.131, N = 233, p < 0.01), and the Webexec (r = 0.148, N = 233, p < 0.01).

When the sample was split based on participants' participation in sport, AUDIT scores for those active in sport were not significantly correlated for the PMQ or the Webexec, however the EMQ was still positively correlated with AUDIT total score (r = 0.382, N = 47, p < 0.01). AUDIT scores for people not participating in sport were significantly correlated with the PMQ (r = 0.324, N = 198, p < 0.01), EMQ (r = 0.269, N = 186, p < 0.01), and the Webexec (r = 0.293, N = 186, p < 0.01).

5.3.2.1 Phase 2 Memory Scores

Scores were obtained for 73 of the 75 participants on the PMQ, EMQ and the Webexec questionnaires. The mean score for the PMQ was 50.01 (SD = 21.05, range 23-131), the mean score for the EMQ was 67.38 (SD = 25.40, range 28-143) and for the Webexec the mean score was 10.40 (SD = 3.11, range 6-21).

The mean scores for the three subscales of the PMQ , the long-term, internally cued and strategies for remembering subscales, were as follows; PMLT = 28.29 (SD = 15.17, range 2-96), PMIC = 21.73 (SD = 9.36, range 9-51), PMSR = 46.76 (SD = 26.10, range 14-119).

Sport Participation & Gender:

When comparing the memory questionnaires between the groups involved in sport (playing member, non-playing member), there were no significant differences on the mean scores for any of the tools used or the subscales within the PMQ. This was also the case when comparing these tools based on gender, where female participants reported more deficits but not significantly so.

5.3.2.2 Interactions

Significant positive correlations were found between total AUDIT score and the PMQ ($r = 0.489$, $N = 73$, $p < 0.01$), EMQ ($r = 0.432$, $N = 73$, $p < 0.01$), and the Webexec ($r = 0.402$, $N = 73$, $p < 0.01$). When only comparing the consumption items on the AUDIT this association still remained significant at the 5% level for the PMQ ($r = 0.278$, $N = 73$, $p < 0.01$), EMQ ($r = 0.240$, $N = 73$, $p < 0.01$), and the Webexec ($r = 0.292$, $N = 73$, $p < 0.01$).

When the sample was split based on participants' participation in sport, AUDIT scores for those active in sport were significantly correlated with the PMQ (r = 0.681, N = 15, p < 0.01)and the Webexec (r = 0.563, N = 15, p < 0.01), however the EMQ was not correlated with AUDIT total score. AUDIT scores for people not participating in sport were significantly correlated with the PMQ (r = 0.399, N = 58, p < 0.01), EMQ (r = 0.425, N = 58, p < 0.01), and the Webexec (r = 0.409, N = 58, p < 0.01).

5.3.3.1 Phase 3 Memory Scores

Scores were obtained for 40 participants on the PMQ, the EMQ and the Webexec questionnaires. The mean score for the PMQ was 47.32 (SD = 24.45, range 20-146), the mean score for the EMQ was 64.13 (SD = 25.93, range 32-153) and for the Webexec the mean score was 10.70 (SD = 3.73, range 6-19).

The mean scores for the three PMQ subscales were as follows; PMLT = 25.57 (SD = 13.77, range 6-74), PMIC = 21.75 (SD = 12.03, range 10-72), PMSR = 45.95 (SD = 21.52, range 10-90).

Sport Participation:

The mean score for people who participated in sport indicated that they reported less memory deficits on all memory measures than those not participating in sport, however, none of these differences approached significance.

Gender:

Female participants reported more memory deficits than male participants on all of the memory measures however these differences were not significant.

Within the PMQ females reported significantly more errors on the PMIC subscale (t = 2.07, df = 38, p = 0.05).

5.3.3.2 Interactions

Significant positive correlations were found between total AUDIT score and the PMQ ($r = 0.419$, $N = 40$, $p < 0.01$), EMQ ($r = 0.565$, $N = 40$, $p < 0.01$), and the Webexec ($r = 0.415$, $N = 40$, $p < 0.01$). When only comparing the consumption items on the AUDIT this association still remained significant at the 5% level for the EMQ ($r = 0.355$, $N = 40$, $p < 0.01$).

When the sample was split based on participants' participation in sport, AUDIT scores for those active in sport were not significantly correlated for the EMQ or the Webexec, however the PMQ was still positively correlated with AUDIT total score ($r = 0.371$, $N = 5$, $p < 0.01$). AUDIT scores for people not participating in sport were significantly correlated with the PMQ ($r = 0.371$, $N = 35$, $p < 0.01$), EMQ ($r = 0.549$, $N = 35$, $p < 0.01$), and the Webexec ($r = 0.365$, $N = 35$, $p < 0.01$).

5.3.4 Longitudinal Comparison

When comparing mean Memory scores for the PMQ, EMQ and Webexec there were no significant change across the three phases. There was insufficient data from sports participants at phase 3 to compare the scores based on involvement in sport via a t –test.

5.4 Discussion

The second aim was to determine if the students perceived there to be any noticeable impact of alcohol use on their everyday cognition while at university and to see how this perception changes, if at all, following graduation. It was clear that throughout the study, increased alcohol use was associated with a perception of increased memory deficits on all three memory measures used. The overall number of deficits reported

did not differ across the duration of the study. Female participants reported more deficits while at university however this difference was not present elsewhere.

When comparing the number of memory deficits self-reported at phase 1 by participants there were significant differences between participants involved with sport and those who were not on aspects of prospective memory. However, there were no differences when comparing the scores of students on different types of degree being studied (sport related versus not sport-related). There were some differences in terms of memory deficits between genders with female participants reporting more memory deficits than males on all measures at phase 1. This difference was small but may be worthy of further investigation as current literature has recorded female participants outperforming male peers on prospective memory tasks (Riess, Janoszczyk, Niedźwieńska, & Rendell, 2017), although this was observed in older populations than used in the present study.

A similar number of memory deficits were reported at each phase in the study, which is potentially of concern considering the reduction in alcohol consumption. When comparing the findings from this study with those that have used similar populations, the scores exhibited here were higher than seen previously (Heffernan et al., 2006). Memory has been shown to recover in older populations following a reduction in alcohol consumption to great degrees (Brandt, Ryan, & Bayog, 1983), however despite a significant reduction in alcohol consumption across the sample from Phase 1 (Graduation) to phase 3 (24-27 months post-graduation) there was no significant change in self-reported memory. It is worth noting that despite the reduction in alcohol consumption the mean AUDIT score at each phase was still within the Hazardous category, where there is an increased risk of alcohol related harm (Babor et al., 2001).

It would be interesting to see if the mean score were to drop below hazardous, would there be any significant changes in self-reported memory scores.

The impact of alcohol on self-reported memory performance was also recorded, and this demonstrated a clear relationship across all memory measures. As has been demonstrated in previous literature, increased alcohol use was associated with an increase in the report of memory deficits. These findings are supportive of those found previously when looking at the relationship between alcohol consumption and CE functioning (Bava & Tapert, 2010; Heffernan T, et al., 2002; Heffernan T. M., 2011; Ling, et al., 2003). As it has been established that CE functioning can have a direct impact on academic performance (Best John R, Miller, & Naglieri, 2011), this finding is of particular importance considering that the current sample consists of students whose career success is related to their academic performance. This association between increased alcohol consumption and increased reporting of memory deficits remained across the study duration.

Perhaps the most interesting observation of the relationship between alcohol use and memory is when sports participants were compared separately from their non-sporting peers. When doing so it can be seen that in the students who are participating in sport, consumption was not associated with perceived deficits on the all of the memory measures, despite their more hazardous drinking patterns. However, the students who were not participating in sport displayed an increased number of reported memory deficits as their alcohol consumption increased. This finding warrants further investigation. It would be valuable to determine if there is any possibility that participation in sporting activity may protect against the deficits in PM and CE functioning caused by alcohol consumption. Unfortunately, this is not

something that can be determined from the findings of the current study but is a potential avenue for future research.

To summarise increased alcohol consumption is also positively correlated with an increase in self-reported memory deficits and that despite reductions in alcohol consumption, self-reports of memory deficits were similar across the course of the study.

6 A lab based study on PM in heavy drinking students

6.1 Introduction

Findings from the baseline phase of study one highlighted differences in the performance in prospective memory (PM), and to some extent executive functioning, between students playing sport and those who were not. This finding was of interest as any protective effect of sport participation would be of note when designing interventions and providing advice for heavy drinking students. However, as the purpose of study one was not explicitly to examine the differences between sports participants and people who do not play sport it becomes necessary to investigate this potential association further. Recent recommendations from researchers in the field of PM stress the need to utilise real-world PM tasks when drawing conclusions of this kind, as PM functioning in the real world may be sensitive to a range of influences that are either absent or controlled for in other study designs (McDaniel & Einstein, 2007). As such, this study adopts one such real-world task to examine the difference in PM between students who play sport and those who do not in detail.

One of the key findings from study one was that students who played sport regularly had significantly better scores on the PMQ and Webexec in comparison to those who did not. This observation is of note when considering what is known about the effects of alcohol and exercise on cognition in isolation. There is a growing amount of evidence in favour of the benefits of exercise on cognition. Studies have shown that increasing activity levels has positive effects on aspects of cognition such as spatial memory (Erickson et al., 2011), long term memory (Coles & Tomporowski, 2008), and executive function (Tomporowski, Davis, Miller, & Naglieri, 2008), enhancing performance in these areas. The positive effects of exercise on cognition also have

wider reaching effects on dementia and mental health, with 150 minutes of exercise per week being shown to have a positive impact on these cognitive functions across the lifespan (Kirk-Sanchez & McGough, 2014).

The bulk of existing research on the benefits of exercise to memory examines the decline of memory in the aging adult. It is well established that as the human lifespan progresses there is a decline grey matter volume and pre-frontal cortex function, specifically in the hippocampus (Erickson, et al., 2011; Heffernan Thomas, et al., 2010). Exercise has been as a possible promising low cost alternative to help treat decline in cognitive function, as existing pharmaceutical approaches can be costly with severe side effects (Hillman, Erickson, & Kramer, 2008). Studies over the past decade have demonstrated that increased physical activity can cause an increase in grey and white matter in the pre-frontal cortex (Colcombe et al., 2006) and those adults who maintain a high level of physical fitness have increased hippocampal and medial lobe volumes (Erickson et al., 2009; Honea et al., 2009). These increased volumes have been linked to improved spatial memory (Erickson et al, 2009). Physical exercise is also known to increase cerebral blood flow and that this increased cerebral blood flow can have positive effects on central executive functioning (Pereira, Yassuda, Oliveira, & Forlenza, 2008).

The positive effects of aerobic activity on pre-frontal cortex size and function have been further demonstrated in recent experimental studies (Erickson et al, 2011). Adults without dementia were shown to have increased hippocampal volume and increased performance on memory tasks following a 12-month period of physical training. Additionally, research has also demonstrated that in older populations greater positive gains in memory and executive function caused by exercise lead to an increased rate of adherence to exercise programmes in follow up studies (Best John

R., Nagamatsu, & Liu-Ambrose, 2014). Large epidemiological studies across the lifespan have also highlighted that being more physically active earlier in life, especially during teenage years, has beneficial outcomes on cognitive performance in adulthood (Middleton, Barnes, Lui, & Yaffe, 2010).

While the evidence supporting the positive impact of exercise on cognitive control (the flexibility of cognitive processing) and memory in older adults is quite wide ranging there is also a growing literature to support the importance of physical activity for cognitive control and memory in children and adolescents (Chaddock-Heyman et al., 2014; Sibley & Etnier, 2003). In younger age groups movement and active experience is a preferential learning techniques and can facilitate cognitive development (Sibley & Etnier, 2003). Additionally, in studies comparing physically active children with those who were more sedentary improved performance was noted on a variety of memory tasks (Chaddock et al., 2010; Monti, Hillman, & Cohen, 2012). Aerobic fitness and physical activity have also been demonstrated to have a positive effect on cognitive functioning in real world tasks. Research has also highlighted that children were more successful in tasks requiring high cognitive load if they had higher fitness levels (Chaddock et al., 2012).

The majority of research on the benefits of fitness and physical activity on cognitive performance focus on general aerobic activity (Berryman et al., 2014) while a few focus on resistance training. In general, however there it is still relatively unknown what elements of physical activity have the greatest benefit to cognitive performance. There are suggestions that structured exercise has a greater benefit to cognitive performance than general daily fitness (Bherer, Erickson, & Liu-Ambrose, 2013). Recent investigations have purposed that “coordinative exercise” has a greater effect on cognitive performance than cardiovascular or resistance exercise (Voelcker-

Rehage, Godde, & Staudinger, 2011). This is due to the requirement for perceptual and higher-level cognitive processes being involved linked to anticipatory and adaptive aspects of the exercise. These types of activity have also been shown to lead to an increase in hippocampal volume which is linked to increased cognitive functioning (Niemann, Godde, & Voelcker-Rehage, 2014).

Finally considering the finding from study one it is important to consider if physical activity has been shown to have positive effects cognition in any other individuals who engage in harmful health behaviours. One such behaviour is smoking. Smoking is often viewed as a co-morbid variable alongside behaviours such as alcohol consumption, however studies over the past decade have linked chronic smoking with an adverse effect on cognitive functioning (Durazzo, Meyerhoff, & Nixon, 2012; Razani, Boone, Lesser, & Weiss, 2004). As a result of this link a recent study examining physical activity and executive functioning in smokers proposed a conceptual model for the moderating effect of physical activity (Loprinzi, Lee, & Cardinal, 2015). While unable to draw a definitive conclusion there was evidence to support the proposed conceptual model and the moderating effect of physical activity on the relationship between smoking behaviour and executive functioning (Loprinzi et al., 2015).

Taking into account what is known about the relationship between cognitive functioning, heavy drinking, physical activity this study aims to investigate whether heavy drinking students who play sport outperform their non-sporting peers on a “real-world” memory task.

6.2 Methods

Please see chapter 2.3 for further details.

6.3 Results

When examining the scores for recall of locations on the PVRP the participants who were playing sport had a higher mean score of 12.08 (SD = 1.83 range 8-15) compared with those who did not play sport of 9.00 (SD = 1.83 range 7-12). The difference between participants who were playing sport and those who were not was significant for the location elements of the PVRP ($t = 4.54$, $df = 22$, $p < 0.01$).

The second element of the PVRP is the action scale, and when comparing the means of the two groups for this scale participants who played sport scored a mean of 8.83 (SD = 2.41, range 5-14) in comparison to those who did not who scored a mean of 7.08 (SD = 1.68, range 5-11). Again the difference between participants who played sport and those who did not was significant for the action element ($t = 2.07$, $df = 22$, $p = 0.05$).

Finally, when considering the overall score, both location and action correct, for the PVRP participants who were playing sport had a higher mean score of 8.16 (SD = 2.66 range 3-12) compared with those who did not play sport of 6.58 (SD = 2.15 range 2-11). However, conversely to the two sub-elements the difference between participants who were playing sport and those who were not was not significant for the overall PVRP score ($t = 1.60$, $df = 22$, $p = 0.12$).

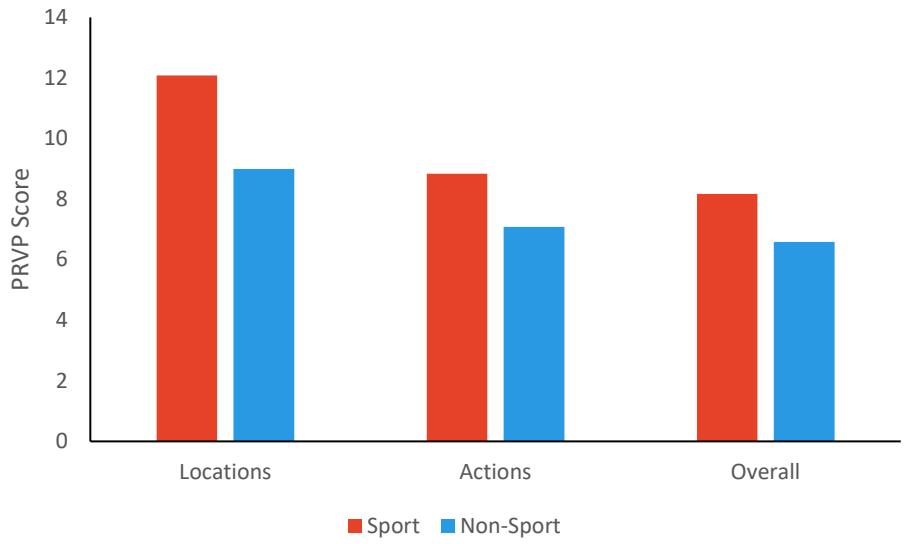


Figure 6 Bar chart displaying mean scores for Location, Action and Overall Score on PRVP in heavy drinkers who play sport and those who do not

6.4 Discussion

The aim of this study was to investigate whether heavy drinking students who play sport outperform their non-sporting peers on a “real-world” memory task. When looking at the overall PVRP score which represents PM, while there was a difference between the groups this difference was not significant. However, when examining the sub-components of the PVRP it can be seen that heavy drinking students who play sport did out perform their non-sporting peers on both locations and actions.

PM is thought to contain at least two elements; a prospective element in which one has to store an intended action and remember this action when a cue appears as a reminder or a specific period of time has passed before one has to act, and a retrospective element which enables you to recall the specific details of what it is (the action) you had to remember to do (McDaniel & Einstein, 2007). For example, a person might plan to take an important medication immediately after finishing a meal

(remembering a plan) and then upon finishing dinner recall what medication needed to be taken and in what dosage (retrospective element). The PVRP takes into account these two elements by incorporating two sub-components that make up the overall measure of prospective memory. Looking at both elements separately enables one to assess whether a particular group has deficits in one element (PM/RM) or both. The first of these is the location which can be seen as the "when to do" element of the task, which is the prospective element. It was clear from the analysis of the results that participants who played sport were significantly better at recalling when they were supposed to complete an action than those who did not play sport. It has been suggested that this element of the task is the most taxing on memory resources (Levén, Lyxell, Andersson, Danielsson, & Rönnberg, 2011). If an individual struggles with this element of the task it increases cognitive demand, subsequently reducing performance on the "what to do" element of the task which acts as the retrospective element. When the action sub-component, acting here as the "what to do" element of the task, is examined more closely participants who played sport again significantly outperformed those who did not. Both groups recalled fewer actions correctly when compared with the locations. This is consistent with the notion that the latter element is more taxing on memory and as such hampers the former. Somewhat surprisingly, the number of correct combinations of locations and actions did not differ significantly between the groups despite the differences when examining the sub-components individually.

Evidence from study one suggested that there may be some sort of moderating effect on the cognitive deficits associated with heavy alcohol consumption by sport participation. Studies into other health behaviours such as smoking have also purposed such an effect (Loprinzi et al., 2015). The findings from this study also

suggest that there is some influence of sporting activity on prospective memory performance with participants who play sport recording higher scores on the sub-components of the PVRP. However, it is important not to overstate this effect as the difference on PM as a whole was not as great between the groups. The reduction in magnitude of this difference could suggest that there are factors involved in the relationship between PM and alcohol consumption that have not been controlled for in this protocol. Erickson et al., (2011) highlighted several aspects of pre-frontal cortex function that have an influence on cognitive performance such as grey matter volume, increased blood flow and concentrations of neurotransmitters.

Additionally, it is not known from the results of this study what, if any, difference in PM exists between students who play sport and those who do not in non-drinking populations. All of the participants in this study were classified as hazardous or above drinkers using the AUDIT. The literature outlines that physical activity has a beneficial impact on cognitive processes, including PM, a various stages of the human lifespan (Chaddock-Heyman et al., 2014; Erickson et al., 2011; Sibley & Etnier, 2003). It is possible that the difference in the PM and RM elements of the PVRP are of a similar magnitude in both heavy drinking and non-heavy drinking populations, and as such the difference being observed is consistent between all sports participants and their non-sporting peers. It is also worth noting that this study didn't differentiate participants by the type of sport they competed in. Recent research has highlighted the benefits of physical activity involving coordinative exercise to memory (Voelcker-Rehage et al., 2011). It is possible that the failure to find any difference in overall PVRP score could be due to the types of sport participants were involved in. Endurance sports would be less likely to involve the coordinative elements as invasion and ball sports such as

rugby or tennis. To include this in the analysis a considerably larger sample would be needed.

Another potential limitation of this study is that the general level of physical activity for all participants was not recorded. It is possible that participants who were placed in the non-sport group were physically active through gym memberships or other forms of exercise. While the literature suggests that coordinative exercise is the most beneficial form of exercise in improving cognitive processes (Voelcker-Rehage et al., 2011) there is still a large support for the positive effects of aerobic exercise on cognitive processes (Chaddock-Heyman et al., 2014; Erickson et al., 2011; Sibley & Etnier, 2003). Unfortunately this was not accounted for in the current study as an unfortunate oversight. In any future investigation it would be important to rate the fitness of participants to ensure any effects observed are truly related to sporting involvement.

In terms of future research directions, the need to clearly establish whether sport participation does improve PM in heavy drinkers should be paramount. The findings of this study along with those from study one demonstrate a difference between these two groups in certain cognitive processes, namely PM. While study one utilised a self-report measure of PM, this study employed a “real world” task as this has been suggested to be favourable in previous literature (McDaniel & Einstein, 2007). This particular task, the PVRP, incorporates both prospective (maintaining a plan to perform an action when a specific location is reached) and retrospective (recalling the details of a specific action needed to be carried out upon reaching the location) elements. Due to the differences in performance between the sport and non-sport participants on the PVRP and its sub-components, further testing to determine if only certain aspects of PM are influenced by sport should be explored. If the link

between heavy drinking and PM, and the apparent beneficial effect of sport on PM in heavy drinkers can be clarified this would have implications in terms of intervention design. Heffernan et al. (2010) highlighted the need to understand the causes and consequences of drinking patterns with a view to using this knowledge to influence prevention campaigns. With various government initiatives such as “Moving More, Living More” (Mansfield, Anokye, Fox-Rushby, & Kay, 2015) already targeting increased physical activity in the UK population, links with improved cognitive functioning could help drive their success.

6.5 Conclusion

To conclude, the results of this study did not show any overall difference between heavy drinker who played sport and those who did not on the PVRP, a “real world” measure for PM. However, as PM can be viewed has having two elements, both PM (remembering when to do an action) and RM (remembering what the specific action is), these elements of the PVRP were examined independently. From the analysis of these sub-components there were notable differences in performance between the experimental groups in both the PM and RM elements of the task. These differences highlight a potentially beneficial effect of sport participation in heavy drinkers. This finding could have implications for clinicians in terms of strategy for improving cognitive functioning in a range of populations, including those who drink heavily. It is important to note that further research into the effects observed here would be necessary before any firm conclusions could be reached.

7 General Discussion

This thesis was carried out to explore three research questions. The first and primary question was to take a longitudinal perspective on students' relationship with alcohol. Specifically, does the phenomenon of "maturing out" occur, and what factors might have an influence on this? A longitudinal approach has only rarely been used to explore drinking behaviours in the student population, and the last study of this kind in the UK was carried out in 2001. Therefore, there was a real need for another investigation to gain insight into the current picture. The second question posed in this programme of research was designed to shed further light on the relationship between sport participation and alcohol consumption. This was investigated from both a quantitative and qualitative longitudinal perspective to not only see how this might change over time but also to understand why. The final research question of this thesis was to explore the impact of alcohol consumption on everyday memory and executive function in students and recent graduates. This was also looked at from a longitudinal perspective to see if there was any impact of heavy drinking on prospective memory while at university and if this changes following university, particularly if there are changes in drinking behaviour.

7.1 Research Question 1: The changing relationship with alcohol over time

There is a recognised need to build on existing longitudinal research to understand more clearly how students' relationship with alcohol changes across the lifespan. Study one adopted a longitudinal design over a timeframe of 28 months to try and gain some insight into this relationship. The design of study one allowed for an understanding of consumption levels to be established while students were still at

university. Baseline findings from this quantitative longitudinal study reconfirmed existing evidence regarding alcohol use amongst students. AUDIT scores were used as a measure of alcohol consumption and its associated risk. The mean AUDIT scores for all participants at phase 1 of the longitudinal study were in the hazardous range with nearly three quarters of the sample being classified as hazardous or higher. The scores recorded here were slightly higher than comparable recent studies such as that carried out by Partington and colleagues (2013). One explanation for this discrepancy may be the fact the sample in the Partington study was made up from institutions across the UK. One of the finding Partington and colleagues (2013) observed were regional differences in alcohol consumption with universities in the north of England typically scoring higher for alcohol consumption. Additionally, baseline data collection from the longitudinal survey further confirmed the trend of higher levels of alcohol consumption in students participating in sport in comparison with their non-sporting peers.

The qualitative design of study two allow for a better understanding of what drives these high levels of alcohol consumption and alcohol related harm in sports participants. The qualitative data gained from study two provided added depth and context to the findings from study one, which has not been replicated elsewhere in the same fashion. Several motives established by Kuntsche & colleagues (2005) were also observed in the present study. There were a wide range of social motives described by the students taking part in study two. These included drinking heavily due to the desire to enhance mood, cope with stress, to gain social benefits and to avoid social rejection by conforming to cultural drinking norms. Mood enhancement was also common at this stage, with participants remarking that engaging in drinking enabled them to feel at ease in the university environment. In addition to these

motivations to drink alcohol, for participants in this sample, peer pressure, both direct and indirect, seemed to be very influential on student drinking. The participants involved in study two unanimously reported feeling the influence of their peers on their drinking behaviour. Fear of missing out or of social exclusion were the most prevalent descriptions of peer pressure amongst final year students. Additionally, the pressure to reciprocate the purchasing of drinks in a “round” was also prevalent amongst the sample of students at phase 1 in study two.

These motivations to drink are consistent with previous studies into student drinking. It has previously been demonstrated that students, particularly male students, are likely to adopt drinking behaviours they deem to be normal amongst their peers (Studer, et al., 2014). This continues on from adolescence where again peer pressure is a common factor in alcohol consumption (Teunissen, et al., 2016). Round buying is another form of peer pressure that is established in existing literature. Cherrier & Guerreri (2012) highlighted the pressure from round buying as a key barrier to reducing alcohol consumption. While often neglected in studies into alcohol consumption, drinking to avoid social rejection or to fit in has also been demonstrated as a motivation in existing literature (Taylor et al., 2017).

One of the few barriers to alcohol consumption at phase 1 of data collection was the obligation to fulfil important responsibilities. However, the only responsibility that seemed of significance to the participants was the submission of key assessed work related to their degree programmes. Day to day responsibilities, such as attending lectures and part-time jobs were not widely reported as being a significant barrier to alcohol consumption. It is these types of “adult” responsibilities that are seen as key in the concept of maturing out (Dawson et al., 2006; O’Malley, 2004). It would

seem that in this sample, such responsibilities were not prominent during the final year of university.

Moving onto phase 2 which took place over a year from phase 1, the study-one data began to indicate some changes in alcohol consumption. While the mean AUDIT score for the remaining participants was still in the hazardous category it had reduced from the baseline stage at phase 1, albeit not significantly so. This finding is in line with findings from previous literature (Arria et al., 2016; Vik et al., 2003). This differs from the finding of Newbury-Birch and colleagues (2001) but their study was comprised of a distinctly different population of (medical) students, and this may account for the difference in findings. When examining the phase two qualitative data from active university sports participants, further support and explanation for the notion of maturing out was found. Responsibilities were more widely reported as a barrier to alcohol consumption at this phase. During phase one, day to day responsibilities such as jobs were not seen as a significant barrier to alcohol consumption, however, at phase two this had changed. Even participants only involved in part-time or casual jobs reported these responsibilities as being a barrier to their alcohol consumption.

The key motivations for alcohol consumption had also started to change by this phase of data collection. Interestingly, the motivations for drinking were overlapping and possibly interacting here. At this point, participants were still drinking to enhance mood but also now to increase levels of confidence to aid with new social interactions (enhancement motive). They also drank to reduce stress around new interactions (coping motive) and to gain social acceptance (social motive). The need to conform was less explicit but still present at this stage. Of interest, is the finding that for some, conformity meant conforming to the lower levels of drinking that were present in their new drinking culture (socialising with work colleagues). In this instance, the desire to

conform had actually served to reduce their alcohol consumption. This may partially explain the ‘maturing out’ that seemed to be taking place at this time.

The final phase of data collection took place when participants were at least 26 months after graduation. Results from study one continued to show a mean AUDIT score, for the sample, in the hazardous range but importantly when compared with drinking whilst at university there was a significant reduction in levels of consumption. This is consistent with the findings of Arria and collegaues (2016) who found a similar reduction in alcohol consumption in a sample from the USA. One key difference with Arria’s data came in regards to how alcohol was consumed amongst participants, with alcohol consumption taking place on more days per week but in smaller quantities. These differences were explored more within the qualitative data from study two.

Qualitative data from study two showed that at time points 2 and 3, participants favoured drinking heavily in one or two sittings per week. Arria and colleagues (2016) had noted an increase in the frequency of alcohol consumption despite a reduction in the total volume of alcohol consumed. In this current sample, a trend of binge drinking was still evident but was occurring less frequently. While at university, there may have been 2 or 3 separate occasions of binge drinking (e.g. Wednesday night, plus weekends). Once participants had left university this seemed to be restricted to one of the weekend days. Aria’s work (2016) was conducted in the USA which may go some way to explaining this difference, for example college football takes place exclusively on Saturdays (Quintanar, Deck, Reyes, & Sarangi, 2015) so the heavy drinking associated with playing and watching these events is already localised at the weekends.

The prevalence of hangover was also widely reported at phase 3 and was seen as a significant barrier to alcohol consumption, usually linked to participant's' life responsibilities. Participants were conscious to avoid the negative effects of hangover, such as headaches and nausea (Verster, 2008), in close proximity to the types of adult responsibilities associated with maturing out (Dawson et al., 2006; O'Malley, 2004). Overall, in this sample, there does seem to be clear support for the notion of maturing out as participants move away from university and into a more adult environment. The qualitative data suggests that for those participating in sport, the reduction in their drinking was a direct result of increasing work, life and relationship responsibilities, and a change in their overall priorities. It was also the case for participants in this sample that a strong desire to conform to the group norms of their social circles was driving their drinking behaviour at each stage. Whilst at university, when heavy drinking was the accepted norm, participants experienced direct and indirect pressure to conform to this level of consumption. Once they had left university, and had begun to establish new social circles, they adapted their drinking behaviour to bring it in line with the (lower) consumption norms of their new social groups. They experienced less direct pressure to conform after leaving university but did still experience some in direct pressure.

What is of particular interest is that in this sample, the maturing out phenomenon seemed to be more marked in those who had been drinking most heavily whilst at university, i.e. participants who had played sport. This may be reflective of the larger contrast between the drinking norms of their university sports teams and those of their new social circles (work colleagues). It may also speak to the difference in drinking norms, and drinking culture between university sports teams/clubs, and external sports organisations. Note that although the 'maturing out' was seen to be

more marked in those who participated in sport, these individuals were still drinking more than their non-sporting peers at time point three.

However, despite the reductions in the levels of consumption, at time point three, it is important to note that the majority of participants were still engaged in drinking behaviour that would be classified as hazardous, 26 months after graduation. It could be that although participants feel that they have reduced their drinking to sensible levels, their perception of what constitutes sensible drinking is in accurate. This lack of accuracy may be due to the high levels of alcohol consumption that are the cultural norm whilst at university.

A further factor that could explain why participants have not matured out to 'low risk' alcohol consumption could be the extension to adolescence which is being seen culturally across the UK. Initiation into key elements of adult life are being delayed due to factors such as increased university attendance, later entry into the job market and increasing house prices, meaning that young people are delaying taking on roles of responsibility (Setterson & Ray, 2010)

7.2 Research Question 2: The relationship between sport participation and alcohol consumption

The relationship between sport participation and alcohol consumption in students, has been documented in the existing literature. Studies have shown that UK students who play sport at university engage in hazardous drinking, and typically drink at higher levels than their non-sporting counterparts (Heather at al., 2011; Partington et al., 2013). Similar findings have been found in student-athletes in other countries (Yusko, Buckman, White, & Pandina, 2008).

Time point one of study one further confirmed this association between sport participation and heavy drinking. Students in this sample, who played sport drank at significantly more hazardous levels than their non-sporting peers. Study two revealed some new insights into the influence of sporting participation on drinking behaviour whilst at university. In terms of drinking motivations both social motivations and peer pressure were prevalent in students' drinking in relation to their sport. In phase 1 students highlighted the desire to interact socially with teammates in drinking sessions following sporting participation as a key motivation to consume alcohol. Additionally, it was in these social situations that a large amount of peer pressure was perceived to be placed on these individuals. Previous studies have identified excessive alcohol consumption as being key to acceptance in sporting cultures (Sparkes, Partington & Brown 2007). The same study by Sparkes et al. (2007) also highlighted the importance of conformity to cultural rules in university sports clubs/teams. Students here seemed to place more value on their alcohol fuelled, social interactions with teammates than their actual degree performance. It was also interesting that in terms of the barriers being raised by the students here, the responsibilities of elite sporting performance were less impactful than one might imagine, with very little mention of this as a barrier.

Upon graduating from university, sport participation did decline in this sample, and as such the proportion of participants engaged in sport by the end of phase 3 was much lower. At phase 2 people playing sport did still drink more than their non-sporting peers however this gap was no longer significant. When trying to understand these changes using the qualitative data from study two, a change in drinking frequency may have some influence on the reduction in consumption. The participants still involved in sport, particularly those involved in rugby, commented that alcohol was a significant part of the culture of the sport. However, drinking was often restricted just to match

days taking place at weekends, and while there was the expectation to drink the amount of pressure had reduced substantially. This observation is in line with quantitative research into drinking amongst rugby players that highlights their elevated alcohol consumption (O'Brien et al., 2005), while also providing some early signs of maturing out. It is important to clarify that although drinking was reduced here, baseline consumption levels amongst sports people were far above the cut off for hazardous drinking at phase one, meaning that despite the reduction in consumption levels, the mean AUDIT score was still very much in the hazardous range. The pattern of drinking also related to an additional barrier to drinking, with participants now conscious of the negative impact alcohol consumption could have prior to sporting performance. Some participants commented they would never consider drinking the day prior to a sporting event, which was markedly different from phase 1.

With the gap between AUDIT scores further reduced between sports participants and non-sporting peers at phase 3 of the study, it is important to note that participation here was much lower than previous phases, and due to attrition in the sample size of study one, the number of sports participants was much smaller. That being said all of the individuals involved in sport in study one were still part of the sample in study two at this phase and all reported sport participation as being the main context for their drinking. This came in the form of socialising with teammates either following fixtures or celebrating special occasions. Indeed, one of the participants who has returned to playing sport at phase 3 having initially taken a break from competition had seen a rise in her AUDIT scores following her return. She commented that the importance of alcohol consumption to her team's social activities was the main reason for this increase in consumption. Findings on drinking behaviours and pressure to

conform to drinking norms have highlighted this need to fit in amongst student populations and clearly it is still having an impact here (Longstaff et al., 2014).

Using the data collected in study one a mixed effects model was applied to the data to try and determine if sport still had an impact on drinking behaviour once participants had left university. It was important to use a statistical technique such as this as it allows for information from samples with missing data at certain time points to be included in the analysis (Plonk et al., 2011). Using this technique, the data suggests that sport is still associated with an increase in hazardous drinking at phase 3 of the data collection and that typically people who play sport score over 2 points higher on the AUDIT than their non-sporting peers. It would be beneficial going forward to examine data from individuals even further removed from university as, although mean AUDIT scores were declining at phase 3 both sporting and non-sporting groups were still rated as hazardous drinkers. The substantially higher consumption levels while at university could lead to an extension in the time period before maturing-out impacts their behaviour. As mentioned previously, participants' perceptions of what constitutes sensible drinking may have been skewed by the high levels of consumption engaged in whilst at university. Certainly, the qualitative comments indicated that some participants felt that they were now drinking at sensible levels, despite an AUDIT score that contradicted this view. It is important to note that when comparing these individuals drinking it is more "sensible" than when at university. However, it is more than likely personal standards are being used to measure sensible drinking in place of government guidelines, a practice observed elsewhere (Lovatt et al., 2015). Additionally, it would be interesting to see if sport participation itself acts as a barrier to maturing out, delaying some of the other life responsibilities that go hand-in-hand with this phenomenon (Vik et al., 2013).

7.3 Research Question 3: The impact of alcohol consumption on everyday memory and executive function

Due to the strong evidence base linking excessive alcohol consumption to an increase in a wide array of memory deficits (NIAAA, 2004), it was important to examine the impact of alcohol use on some of the most at risk aspects of memory. Study one used three self-report tools at each phase of data collection to allow an understanding of PM, EM and central executive functioning to be determined. At the baseline stage of data collection, it was evident that alcohol use was strongly associated with an increase in the prevalence of memory deficits. This relationship was observed on all three of the measures of memory included in the survey. The findings of study one add to the existing knowledge base on the impact of alcohol on PM, EM and CE functioning by reaffirming the negative impact of heavy alcohol consumption on memory, that has been identified in other populations. This relationship has now been demonstrated in adolescent populations (Heffernan et al., 2006) and in young adults (Heffernan et al., 2002; Heffernan et al., 2004).

One of the key questions posed before commencing this investigation was whether the reported memory deficits would still be reported in those participants who had reduced their alcohol consumption. Some studies have demonstrated that memory performance recovers in heavy drinkers following a reduction in alcohol consumption; however this was in older populations (Brandt et al., 1983). As the human brain is still maturing until early adulthood (Bava & Tapert, 2010; Spear 2002), it is important to determine whether there would be any recovery of memory function in younger previously heavy drinking populations. The data from phases 2 and 3 of data collection for study one show that alcohol use continues to be associated with an increase in the number of deficits reported by participants. One area that may be of

concern from this data is that the mean scores on each of the memory measures varied very little over the 3 phases of data collection. This is despite a significant reduction in alcohol consumption between phases 1 and 3. It is important not to assume too much here, as Mean AUDIT scores were still rated as hazardous and it may be that further removed from the heavy drinking patterns of university there is more obvious perception or awareness of recovery in memory performance. Additionally the self-report nature of the data collected in study one means that it could just be the perceptions of memory deficits has not altered while actual performance on objective tests may reveal different results. However, this is certainly one finding that is worth further investigation. A more extensive follow up study covering a wider timescale and utilising objective memory tests may reveal more insight into any changes in memory performance.

The qualitative data of study two did also reveal some evidence that graduates were somewhat aware of the deficits in memory they were reporting. During phase one of data collection the main cognitive impact participants were aware of was short term loss of memory, meaning often they could not remember what happened while under the influence of alcohol. When experiencing this participants were reliant on testimony from friends and drinking companions to recall key events from the night before. This is something that has been found in previous literature and can be explained by existing knowledge about the impact of alcohol on sleep, reducing sleep quality and hindering recall of recent memories (Irwin, et al., 2006).

Following the baseline phase of data collection during phase 1 of study one it was observed that heavy drinking participants that played sport reported differences in performance in PM when compared with heavy drinkers who did not play sport. Certain types of physical activity have been shown to be particularly beneficial to

cognitive performance and memory (Cole & Tomprowski, 2008; Erickson et al, 2011; Tomporowski et al., 2008). Study 3 was designed to explore this finding in greater detail.

Recent recommendations in the field of PM highlight the need to utilise real-world PM tasks, as PM functioning in the real world may be sensitive to a range of influences that are either absent or controlled for in other study designs (McDaniel & Einstein, 2007). This approach meant that more objective measures of memory performance were taken in comparison to the self-report measures utilised in study one. By utilising a video-based exercise, it was hoped that a greater understanding of these observed differences in self-report of performance could be better understood.

Findings from study 3 did not reveal any difference in PM between the two groups of heavy drinking students (sport participants and non-sporting peers). However, PM has two distinct components, prospective and retrospective. When breaking down the participants' performance by these distinct tasks there were some differences in performance. People who played sport were much better at remembering the distinct actions to be carried out and when to complete them. However, they often mismatched these in combination which meant that their overall performance differed little from that of the participants who did not play sport. It is impossible to make any claims regarding causality in relation to this finding but the possibility of beneficial effect of sport participation on the memory of heavy drinkers is something that could be explored further in future studies.

7.4 Limitations & Future Research

While every care was given to make the studies described here as robust as possible there are some limitations of note worth discussing. The first and one of the

most noteworthy is the low retention rate of students from phase one to phase 3 of study one. Typically, attrition rates can vary from only 30% of the sample up to 80% of the sample (Gustavson, von Soest, Karevold, & Røysamb, 2012). Given the importance of such studies this issue is of concern. Despite using social media engagement and the use of monetary incentives (prize-draws) to maintain participant engagement, a high rate of attrition was seen here (40 participants left from a sample of 261). This was not a complete surprise, as previous longitudinal studies have highlighted the difficulty in retaining participants of this age due their high mobility (Audet, 2004). High attrition is not necessarily an issue for the value of the data and recent investigations into attrition rates in longitudinal studies have demonstrated the value of longitudinal studies with high levels of attrition (Gustavson et al., 2012). Additionally, this study employed mixed effects modelling to try and further reduce the impact of missing data as this gives unbiased parameter estimates and standard error to missing data (Plonk et al., 2011). Future studies may wish to utilise more user friendly sampling methods such as smartphone apps which are more easily accessible to young populations, as this could help with engagement and combat the problem of attrition (Payne, Wharrad, & Watts, 2012).

Another limitation related to the longitudinal nature of the study was the duration of the study itself. While longitudinal studies can cover a wide range of follow up periods (Gustavson et al., 2012), the fact that in the current climate, it has been suggested that the transition to adulthood is typically delayed, the 30 month follow-up period may not allow sufficient time for individuals to transition away from their student behaviours (Setterson & Ray, 2010). If future studies of this nature were to be carried out an extended follow up period would be recommended to observe this phenomenon in more detail.

One limitation of study one, when trying to draw definitive conclusions regarding behaviour, is the self-report nature of the survey. Self-report is a commonly used tool in both medical and psychological fields, as its use allow practitioners and researchers to gain a much wider pool of data (Short et al., 2009). The issues often arise from claims regarding mis-reporting of data due to social desirability factors (Short et al., 2009). All of the measures used within the current study have been validated for their use and have shown robustness in terms of validity and reliability (Buchanan et al., 2010; Cunningham & van Mierlo, 2009; Hannon et al., 1995; Heather et al., 2011; Sunderland et al., 1983). However, it would be unwise to draw definitive conclusions regarding observations made with them without further observational tests with increased ecological validity. This was in part the focus of study 3 and future research should attempt to replicate the assertions made here in a similar fashion.

One aspect that would likely prove challenging in a large scale investigation of alcohol use would be identifying a suitable objective measure. Concerns have been raised regarding the ecological validity of measuring drinking via “bar-labs” or via more phenomenological approaches (Leffingwell et al., 2013). Even when using equipment to accurately measure alcohol consumption, such as breathalysers, blood spotting or urine samples you are still relying on participants, who are often intoxicated to comply with testing procedures (Kummer, Lambert, Samyn, & Stove, 2016). Transdermal sensors have shown some promise in recent years but often the technology can be deemed a hindrance by participants, and it’s practicality in a large scale study would be questionable (Leffingwell, et al., 2013).

Other issues regarding study one relate to the single institution used to sample the data and the type of individual included in the data itself. It would be inappropriate to draw conclusions about the UK university population from just this sample. The

institution from which this sample was drawn was in the North of England, and other studies have commented on the cultural differences that can exist between different regions within the UK (Heather et al., 2011). A wider range of institutions from across the UK would allow for a clearer picture of alcohol use during and post-university to be established. Finally, the fact that over two-thirds of the sample for this study is female is of note. While recent research has demonstrated that female students are consuming alcohol at levels similar to their male peers (Partington, et al., 2013), the well-documented physiological differences between the genders makes a strong case for analysing the differences between males and females more closely.

While not a limitation, study two's focus on sport participants, reduces its generalisability. While the rationale for observation of this particular group was clear, as they had shown themselves to be the most at risk group in terms of hazardous drinking, the opportunity to draw comparisons with other students was missed. Further qualitative studies incorporating different populations of student drinkers, such as people who don't play sport and drinkers from differing AUDIT categories, would allow for a much richer picture of how drinking changes post-university. For example the rate of decline in alcohol consumption was less in people who were not active in sport at university, being able to understand why this occurs would allow for a much better understanding of maturing out.

Limitations for study three were also present as the level of physical activity for all participants was not recorded. It is possible that participants who were physically active through gym attendance were experiencing positive effects of aerobic exercise on cognitive processes (Chaddock-Heyman et al., 2014; Erickson et al., 2011; Sibley & Etnier, 2003). In any future investigation it would be important to rate the fitness of participants to ensure any effects observed are truly related to sporting involvement.

7.5 Conclusions

This thesis presents findings to try and understand the relationship between alcohol consumption and sport participation during student's final year and if this relationship changes following their graduation. Through a series of self-report online surveys taking place over a period of 28 months, it was found that during their final year at university, the majority of participants in this sample were drinking at hazardous levels. Over time, alcohol use across participants significantly declined. However, despite this decline the typical graduate's alcohol use was still rated as hazardous at 28 months post-graduation. At all three data collection points, the mean AUDIT score for those participants involved in sport was higher than the mean AUDIT score for those not participating in sport, further confirming previous findings that this group should be considered a potential at risk group for hazardous drinking.

These findings do present support for the notion of maturing-out, which proposes a reduction in alcohol consumption as life responsibilities increase. However, it is worth noting that this process may occur at a slower rate than previously noted and that delays in the transition to adulthood could be a factor in this. Data from this thesis also suggests that sport participation remains a contributing factor in alcohol consumption, even at 28 months post-graduation.

A qualitative approach was adopted to try to understand the factors that drive alcohol consumption amongst sport people and how this may change over time. Findings from this study suggest that social motives to drink are particularly influential both at university and following graduation. Furthermore, sport is actively perceived by these individuals as being an important factor in their decision to drink alcohol. The main differences between drinking at university and drinking following graduation is

the decline in peer pressure. While this remained a factor, the salience of it amongst participants was greatly reduced. Conformity was still an important consideration and in some cases, participants reduced their alcohol intake to conform with the norms of their new social circles (work colleagues). An additional observation from these qualitative investigations was that the increase in life responsibilities amongst participants was noted and was identified by them as something that was influencing their decisions to temper their alcohol consumption on leaving university.

Finally, this thesis explored the association between alcohol consumption and deficits in prospective memory, everyday memory and central executive functioning. This association remained across the duration of the studies and self-report measures indicated that memory function seemed to recover very little by 28 months post-graduation. One point of note when considering the performance of sportspeople on prospective memory tasks was an increase in performance in the prospective and retrospective elements of the task in isolation. Deeper understanding of this may allow for useful applications of sport to aid in the performance of PM tasks.

Future research into the field of alcohol, sport and memory should focus on expanding the ideas presented in this thesis to other institutions across the UK, to better understand the students' relationship with alcohol. Additionally the longitudinal design presented here should be extended to further explore the concept of 'maturing out'. By doing so a better understanding of the ongoing impact of alcohol use in university graduates would be gained.

8 Appendices

Appendix i Recruitment email

Hi XXX

Thanks you for completing my online survey on alcohol consumption in students. In the participant information at the start of the survey it mentioned that certain participants may be contacted for a follow up interview based on their responses. As such I was hoping to enquire about your availability for an interview over the next 6 weeks. The interview itself should last between 30-60 minutes and the purpose is to gain more information on your perceptions of alcohol use and its relationship to sport.

If you have any further questions please do not hesitate to contact me. I look forward to hearing from you regarding the interview.

Mark Jankowski

Graduate Tutor

Northumbria University

Department of Sport, Exercise and Rehabilitation

Faculty of Health and Life Sciences

Northumberland Building

Ellison Place

Newcastle upon Tyne

NE1 8ST

Tel. 0191 227 3840

Appendix ii Participant Information Sheet

PARTICIPANT INFORMATION

Project Title: A qualitative study of the influences on drinking behaviour in final year university students.

Participant ID Number: _____ ____

Principal Investigator: Mark Jankowski

Investigator contact details: Telephone: 0191 227 4579 Email: mark.jankowski@northumbria.ac.uk

This project is funded by: Northumbria University

INFORMATION TO POTENTIAL PARTICIPANTS

1. What is the purpose of the project?

There has been limited research on alcohol consumption, risk and harm among the UK student population and how this changes after graduation. As a result it is not currently possible to determine the extent to which drinking problems among students persist after graduation and if so, are there any health issues associated with heavy drinking as a student in someone's later years. This study will help form an understanding university students' relationship with alcohol, their motives for heavy drinking and their perceptions of the effect this heavy drinking has on them.

2. Why have I been selected to take part?

You have been selected to take part because you previously completed a longitudinal study associated with this investigation and were among the highest scorers on the Alcohol Use Disorders Identification Test (AUDIT).

3. What will I have to do?

You will be required to complete a one-to-one interview on topics of interest identified in the longitudinal study. Interviews will take place privately in a room on Northumbria University City Campus and will be recorded to allow for verbatim transcription. The interview will last approximately 1 hour. It is intended that this interview will form part of a series of interviews over a 3 year period and that you will be able to participate in a follow up interview again in 12 months time.

4. What are the exclusion criteria (i.e. are there any reasons why I should not take part)?

You should not take part if you do not meet the selection criteria outlined in section 2.

5. Will my participation involve any physical discomfort?

No

6. Will my participation involve any psychological discomfort or embarrassment?

Your interview will consist of questions related to your alcohol use. It is not anticipated that you will find these questions uncomfortable but if you do you are free to withdraw at any point. If the topics discussed in this interview raise your concerns about your own level of drinking and you wish to seek out more information you are advised to contact your GP.

7. Will I have to provide any bodily samples (i.e. blood, saliva)?

No

8. How will confidentiality be assured?

The research team has put into place a number of procedures to protect the confidentiality of participants. You will be allocated a participant code/password that will always be used to identify any data that you provide. Your name or other personal details will not be associated with your data. All electronic information will be stored on a password-protected computer, accessible only by the research team. All of the information you provide will be treated in accordance with the Data Protection Act.

9. Who will have access to the information that I provide?

Any information and data gathered during this research study will only be available to the research team identified in the information sheet. Should the research be presented or published in any form, all data will be anonymous (i.e. your personal information or data will not be identifiable). Your individual information will remain confidential and at no time will it be released to individuals outside of the research team.

10. How will my information be stored / used in the future?

All information and data gathered during this research will be stored in line with the Data Protection Act and will be destroyed seven years following the conclusion of the study. During that time the data may be used by members of the research team only for purposes appropriate to the research question, but at no point will your personal information or data be revealed. Insurance companies and employers will not be given any individual's information, samples, or test results,

and nor will we allow access to the police, security services, social services, relatives or lawyers, unless forced to do so by the courts.

11. Has this investigation received appropriate ethical clearance?

The study has received full ethical approval from the School of Life Sciences Ethics Committee. If you require confirmation of this please contact the chair of the Committee, stating the title of the research project and the name of the Principal Investigator:

Nick Neave

Chair of School of Psychology and Sports Sciences

Ethics Committee

Northumberland Building

Northumbria University

Newcastle Upon Tyne

NE1 8ST

12. Will I receive any financial rewards / travel expenses for taking part?

No

13. How can I withdraw from the project?

You can withdraw your data from this project at anytime, without need for explanation or justification. To do this simply contact the principal investigator by telephone, email or in person.

14. If I require further information who should I contact and how?

Any further information required for this study can be obtain from the principle investigator:

Mark Jankowski

School of Life Sciences

Department of Sport & Exercise Sciences

Northumberland Building (NB248)

Northumbria University

Newcastle-upon-Tyne

NE1 8ST

Tel: 0191 227 4579

E:mail: mark.jankowski@northumbria.ac.uk

If you would like to discuss the study, withdraw your data or register a complaint please contact the chair of the ethics committee on the address listed in section 11.

Appendix iii Consent Form

INFORMED CONSENT FORM

Project Title: A qualitative study of the influences on drinking behaviour in final year university students.

Principal Investigator: Mark Jankowski

Participant Number: _____

	please tick where applicable
I have read and understood the Participant Information Sheet.	☐
I have had an opportunity to ask questions and discuss this study and I have received satisfactory answers.	☐
I understand I am free to withdraw from the study at any time, without having to give a reason for withdrawing, and without prejudice.	☐
I agree to take part in this study.	☐
I would like to receive feedback on the overall results of the study at the email address given below. I understand that I will not receive individual feedback on my own performance.	☐

Email address……..

Signature of participant.....
Date.....……..

(NAME IN BLOCK
LETTERS).....……

Signature of Parent / Guardian in the case of a minor

.....

Signature of researcher.....
Date.....……..

(NAME IN BLOCK
LETTERS).....……

Appendix iv Interview Guide

1) Could you tell me what you were up to in the first year after you graduated?
    a. Living
    b. Work
    c. Study
2) Tell me about what your alcohol consumption was like in the year following graduation?
    a. How often did you drink
    b. How did you tend to drink?
3) When you were drinking what are your motives for doing so?
4) How do you think your motivations changed following graduating university?
5) Could you tell me about your relationship with alcohol over the course of your first year since graduation? Do you feel it affected your:
    a. Cognitive functioning
    b. Work
    c. Sleep
    d. Social life
6) What are your perceptions on the effects alcohol has had on your day to day life over the first year since graduation?
7) Looking Back at University do you think alcohol consumption affected your academic performance could you provide any specific examples?
8) If you could go back and change your drinking habits when at Uni and if so why?
9) Did you play any sport in the first year since graduation?
10) How does your sports participation relate to your consumption of alcohol?

Appendix v Follow-up Interview Guide

1) Could you tell me what you currently up to?
    a. Living
    b. Work
    c. Study
    d. Relationships
2) Tell me about what your alcohol consumption is currently like?
    a. How often did you drink
    b. How did you tend to drink?
3) When you are drinking what are your motives for doing so?
4) What are your current motivations for drinking?
5) Could you tell me about your current relationship with alcohol Do you feel it has affected your:
    a. Cognitive functioning
    b. Work
    c. Sleep
    d. Social life
6) What are your perceptions on the effects alcohol has had on your current day to day life?
7) If you were giving advice to someone just starting University what would it be (studying, socialising, and drinking)?
8) Are you currently playing any sport?
9) How does your sports participation relate to your consumption of alcohol?
10) What are your plans for the future (next few years) how do you think they'll affect your alcohol consumption?

Appendix vi Participant Debrief Sheet

PARTICIPANT DEBRIEF

Project Title: **A qualitative study of the influences on drinking behaviour in final year university students.**

Principal Investigator: Mark Jankowski

Investigator contact details: Tel: 0191 227 4579 Email: mark.jankowski@northumbria.a

Participant Identification Number: _____

1. What was the purpose of the project?

Alcohol abuse has been shown to increase harmful behaviours, to be causally related to physical conditions and to affect brain function in everyday memory. As there has been limited research on alcohol consumption, risk and harm among the UK student population and how this changes after graduation, it is not currently possible to determine the extent to which drinking among students is associated with health. This study will help form an understanding university students' relationship with alcohol, their motives for heavy drinking and their perceptions of the effect this heavy drinking has on them.

2. How will I find out about the results?

If you indicated prior to commencing the study that you wished to be informed of the results, you will be emailed a summary of the findings from the study.

3. Will I receive any individual feedback

Yes, individual scores will be given if requested.

4. What will happen to the information I have provided?

All personal information will be stored in a locked filling cabinet. Any personal information will be destroyed after 7 years. All data acquired from the study will stored on a password protected computer.

5. How will the results be disseminated?

The results of this study, if found to be of sound academic merit, will be published in either peer-reviewed journals or presented as abstracts/posters at conferences. These results will be of the entire group of participants and no identifiable information will be presented. This research will form a chapter of a larger PhD thesis.

6. Have I been deceived in any way during the project?

No.

7. If I change my mind and wish to withdraw the information I have provided, how do I do this?

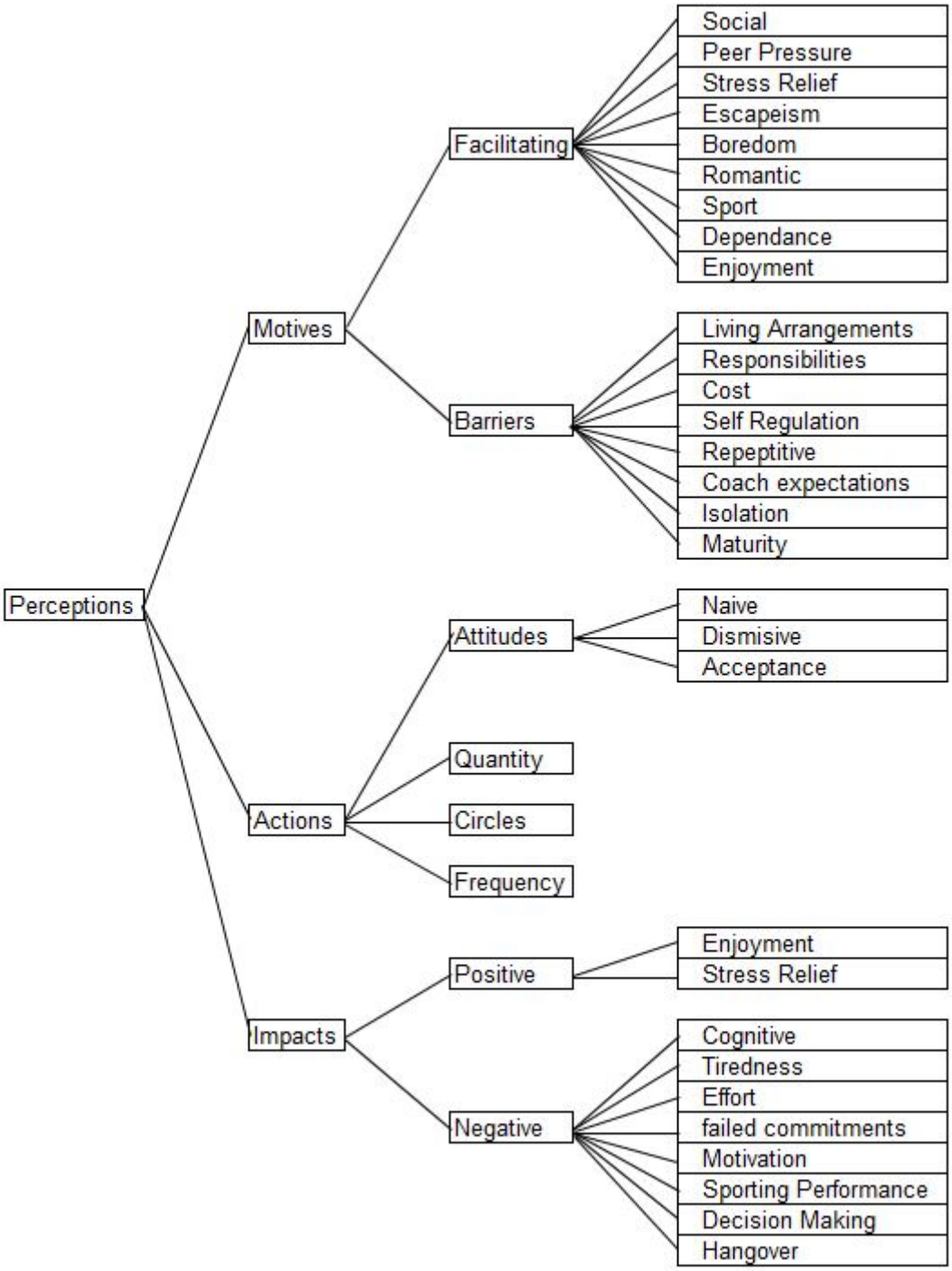
You can withdraw your data from this project at anytime, without need for explanation or justification. To do this simply contact the principal investigator by telephone, email or in person within 4 weeks of the deadline for the study's

completion. After this time and if the research has already been accepted for publication it may not be possible to do so.

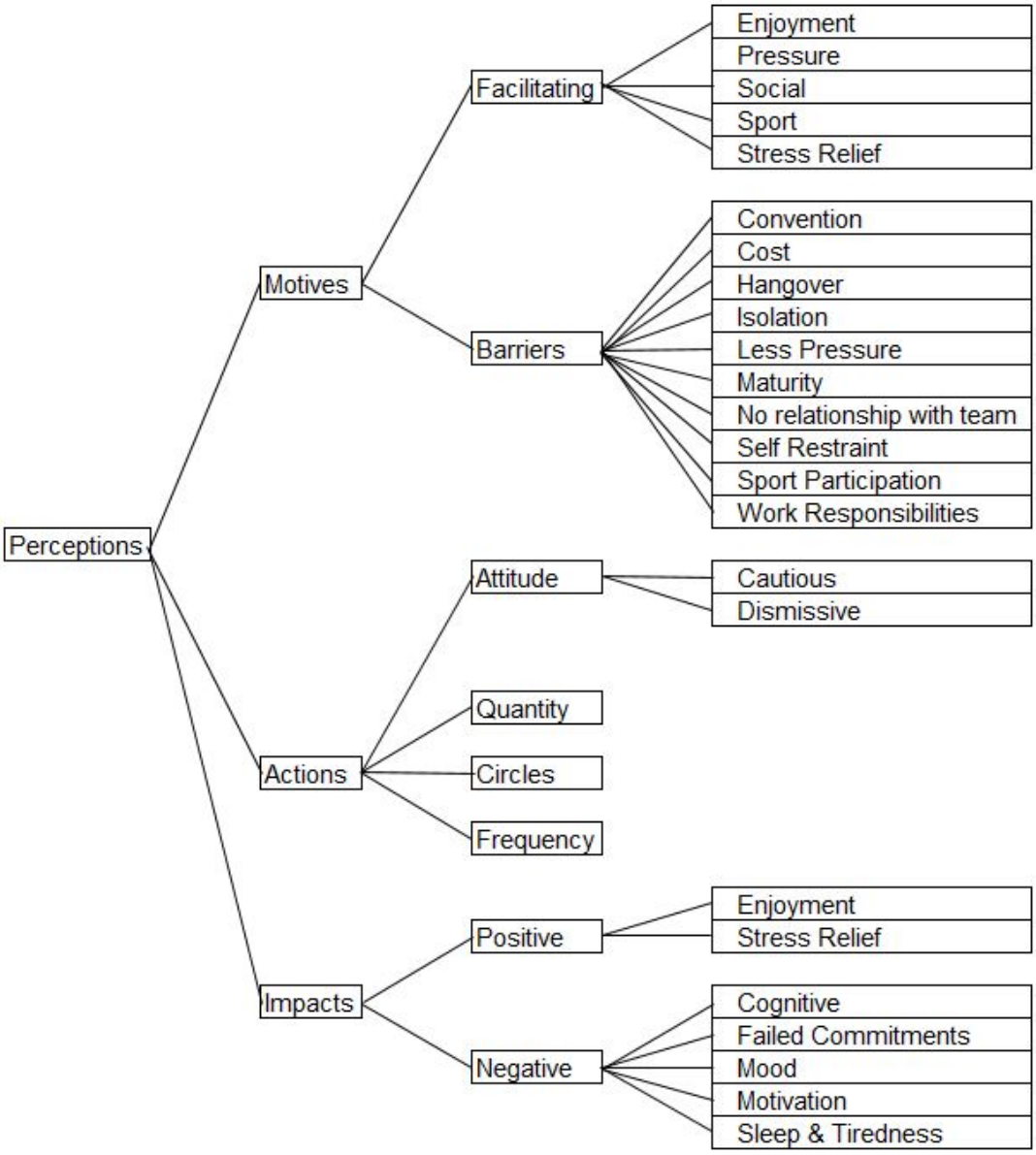
If you have any concerns or worries concerning the way in which this research has been conducted, or if you have requested, but did not receive feedback from the principal investigator concerning the general outcomes of the study within a few weeks after the study has concluded, then please contact Chair of the School Ethics Committee, Dr Nick Neave via email at nick.neave@northumbria.ac.uk.

Appendix vii Coding Trees

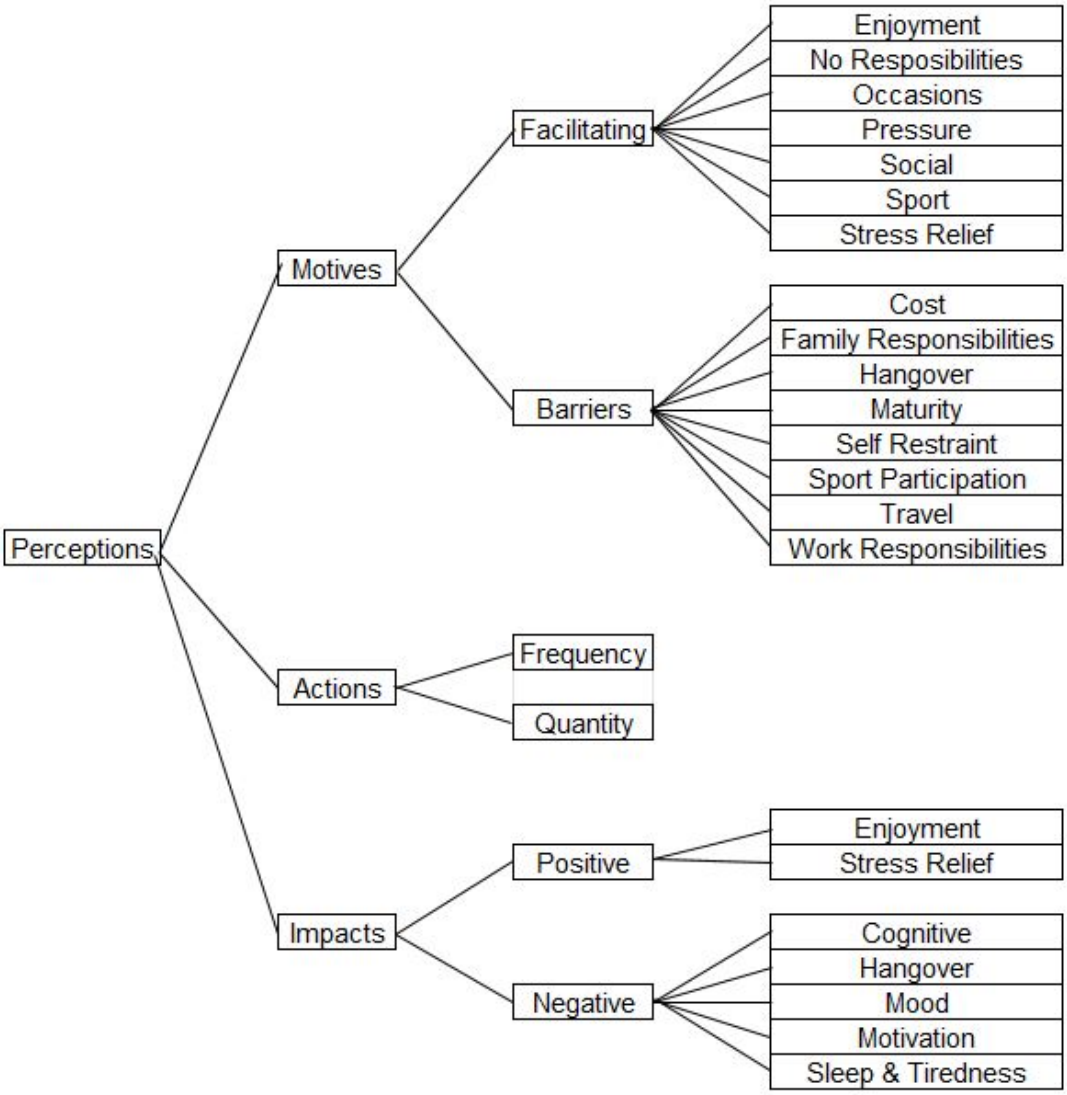
Phase 1



Phase 2


Perceptions
Motives
Facilitating
Enjoyment
Pressure
Social
Sport
Stress Relief
Barriers
Convention
Cost
Hangover
Isolation
Less Pressure
Maturity
No relationship with team
Self Restraint
Sport Participation
Work Responsibilities
Actions
Attitude
Cautious
Dismissive
Quantity
Circles
Frequency
Impacts
Positive
Enjoyment
Stress Relief
Negative
Cognitive
Failed Commitments
Mood
Motivation
Sleep & Tiredness

Phase 3


Perceptions
Motives
Facilitating
Enjoyment
No Resposibilities
Occasions
Pressure
Social
Sport
Stress Relief
Barriers
Cost
Family Responsibilities
Hangover
Maturity
Self Restraint
Sport Participation
Travel
Work Responsibilities
Actions
Frequency
Quantity
Impacts
Positive
Enjoyment
Stress Relief
Negative
Cognitive
Hangover
Mood
Motivation
Sleep & Tiredness

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